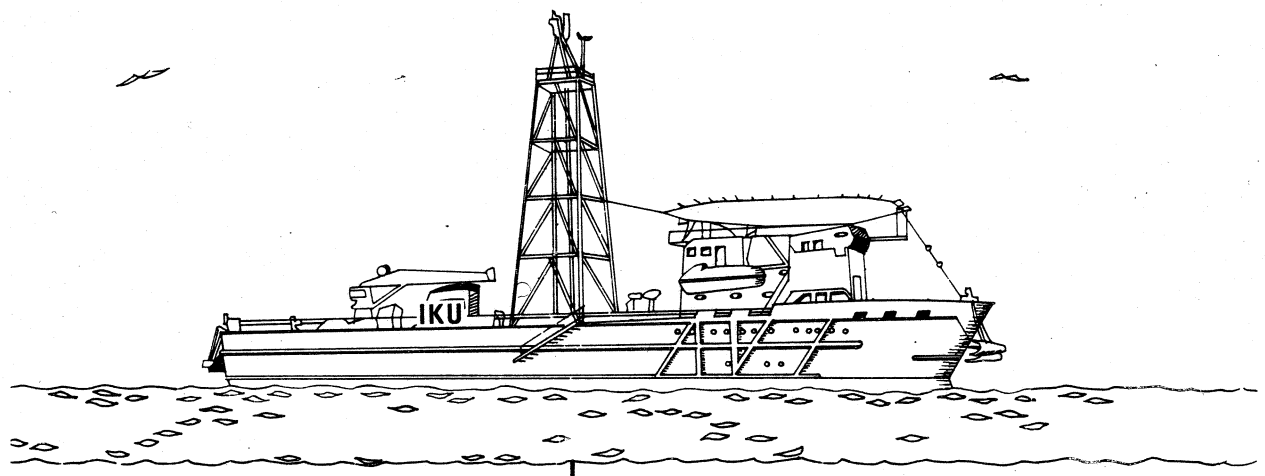
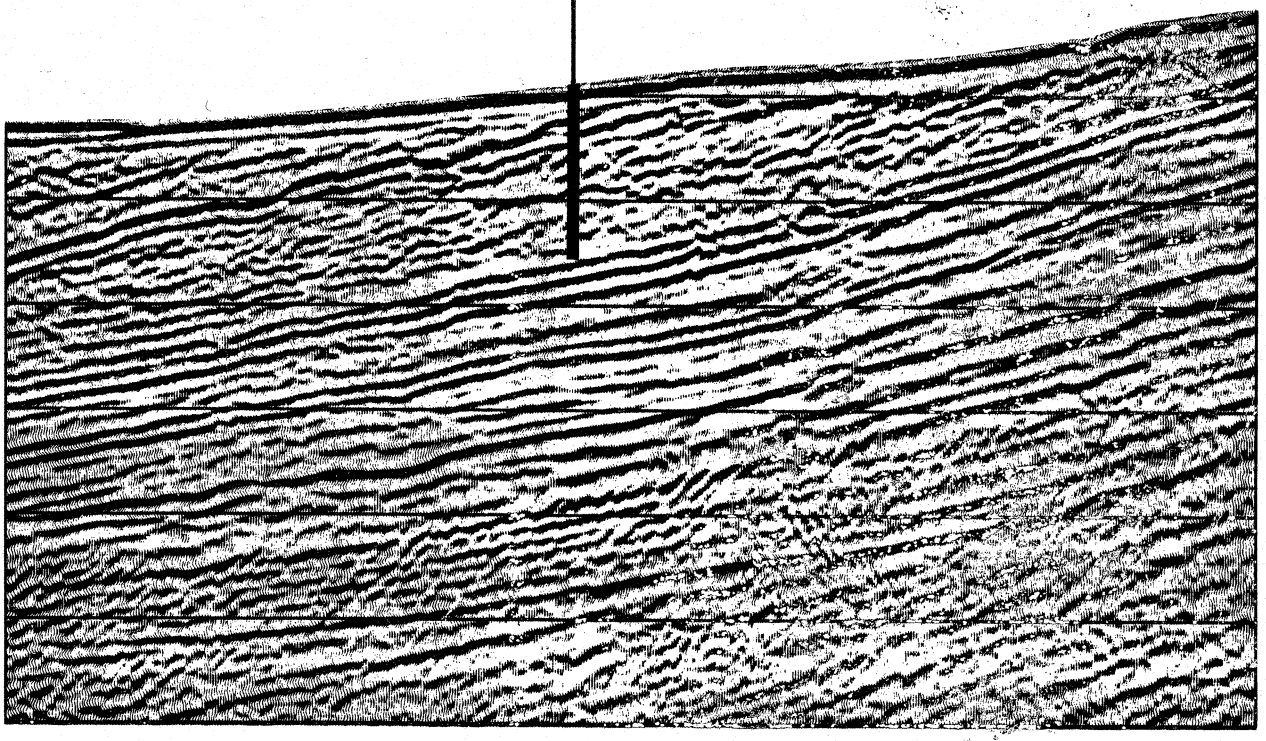
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Shallow Drilling
Møre - Trøndelag 1988

Appendix no. 9
Organic geochemical data



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REPORT

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SHALLOW DRILLING OFF MØRE-TRØNDELAG 1988
APPENDIX 9: ORGANIC GEOCHEMICAL DATA

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SUMMARY:

This appendix includes the organic geochemical data, tables and figures, mostly chromatograms, obtained from the Møre-Trøndelag 1988 core samples. The data are organised on a core-by-core basis, each section having its own table of contents. The text accompanying these data may be found in the main body of the report.

Also included in this appendix volume are descriptions of analytical methods, and comments on identification of compounds in the samples by GC-MS and PY-GC-MS.

KEY WORDS:	
Møre -Trøndelag 1988	Source rocks
Shallow cores	6307/07-U-03A
Organic geochemistry	6307/07-U-02

Skipnes

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SECTION I

ANALYTICAL METHODS

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I.2 INTERPRETATION LEVELS

I.2.1 Total organic carbon
I.2.2 Rock-Eval pyrolysis
I.2.3 Extractable organic matter (or soluble bitumen)
I.2.4 Some ratios calculated from gas chromatograms
I.2.5 Microscopy of organic matter in transmitted and reflected light

I.1 Analytical methods

I.1.1 Gas analyses

a) Headspace gas:

A septum was attached to the can and a sample of the headspace gas was taken for analysis of C_1, C_2, C_3, i-C_4, nC_4 and C_{5+} hydrocarbons.

This analysis was performed on Carlo Erba Fractovap 2150 and 2350 gas chromatographs equipped with 2 m x 1/8" stainless steel columns filled with Porapak Q on Chromosorb using nitrogen as carrier gas. An oven temperature of 150°C was used. After elution of n-butane, the column was back-flushed and C_{5+} compounds were recorded as one peak. A standard gas sample containing methane, ethane, propane, n-butane, n-pentane and n-hexane (100 ppm each) was used for quantification.

The can was then opened and headspace volume, water volume, and sample weight were measured. The canned samples were washed with warm water (30-40°C) on 4.0, 2.0 and 0.125 mm sieves to remove drilling mud and were then dried at 35°C.

b) Occluded gas:

Prior to drying, an aliquot of the 1-4 mm fraction of each sample was crushed in water for 10 minutes using a gas-tight ball mill. The evolved gas was analysed as described for headspace gas.

I.1.2 Total organic carbon (TOC)

Bulk samples were crushed in mortar. Aliquots of the samples were then weighed into Leco crucibles, then treated three times with hot 10% HCl in order to remove carbonate, and finally washed four times with distilled water in order to remove any traces of HCl. The crucibles were then placed on a hot plate (60°C) and dried for 24 hours. The total organic carbon (TOC) content of the dried samples was determined using a CS 244 carbon/sulphur analyser.

The instrument was calibrated using a sediment standard with 2.72% carbon. Calibration and blank runs were carried out every 15th measurement.

I.1.3 Rock-Eval pyrolysis

Powdered sample (100 mg shale, 5-10 mg coal) was weighed into a platinum crucible (the base and cover of which are made of sintered steel), and analysed on a Rock-Eval II pyrolyser (Girdel/IFP) under standard conditions (Carrier gas: helium; flow rate: 100 ml/min.; temperature programme: 300°C (3 min.) - 25°C/min. - 550°C). Some of the samples, including all the follow-up samples, were analysed at Geolab Nor on a RE2/TOC V1-3 pyrolyser.

I.1.4 Extraction

a) Powdered rock was extracted by Soxhlet technique with boiling dichloromethane (DCM) containing 7%(v/v) methanol as solvent in a Soxhlet apparatus for 18 hours.

   DCM of organic geochemical grade was used and blank analyses indicated that the occurrence of contaminating hydrocarbons was negligible. Activated copper fillings were used in order to remove any free sulfur from the samples.

After extraction, the solvent was evaporated off using a Büchi Rotavapor and the amount of extracted organic matter (EOM) was determined.

I.1.5 Precipitation of asphaltenes. Medium-pressure liquid chromatograpy (MPLC)

The EOM sample was diluted in DCM (1:3 mg/µl). Precipitated humic acid-like compounds were filtered, dried and weighed. Then the asphaltenes were precipitated using excess n-pentane (40:1 pentane: (DCM+EOM)). The asphaltene fraction was weighed after drying at 50°C for 12 hours.
The remaining maltenes were separated into saturated, aromatic and non-hydrocarbon fractions using an MPLC system with n-hexane as eluant (Radke et al. 1980). The various fractions were concentrated using a Büchi Rota-vapor. Then they were transferred to glass vials. The remaining solvent was removed.

I.1.6 Urea adduction and extraction of n-alkanes

An aliquot of the saturated hydrocarbon fraction (5 mg) was diluted with n-hexane (2 ml), and 1 ml acetone was added. After this, a saturated solution of urea in methanol (1 ml) was added dropwise. The solvent was removed in a stream of nitrogen and the adduction procedure was repeated two times more. The white crystals were rinsed with hexane (3x5 ml) and the combined extract was filtered through a cotton plug covered with Al_2O_3 to produce a non-adduct containing the branched and cyclic (B/C) hydrocarbons. CGC analyses were performed on the non-adduct using the conditions outlined in the next section.

The urea adduct was dissolved in water (20 ml) and extracted 2 times with DCM (15 ml). The n-alkane fraction was concentrated on a Büchi Rotavapor and transferred to glass vials, and the remaining solvent was removed. CGC analyses were performed on the urea adduct (n-alkanes).

I.1.7 Gas chromatographic analysis (CGC)

Saturated hydrocarbons

The total alkanes, branched/cyclic hydrocarbon fractions and n-alkanes were diluted with n-hexane and analysed on an HP 5730A gas chromatograph equipped with a 15 m DB-1 fused silica column. Hydrogen was used as a carrier gas with a flow rate of about 1.5 ml/min. Injections were performed in split mode (split ratio 1:10). The temperature program used was 80°C (2 min.) - 4°C/min. - 280°C.

All the data from the GC analyses were processed on a VG Multichrom lab data system.

Aromatics

The total aromatic fraction was diluted with n-hexane and analysed on a Varian Series 3700 gas chromatograph with a SE-54 fused silica column (50 m x 0.3 mm) and dual FID/FPD detectors. Hydrogen was used as a carrier gas with a flow rate of 0.5 ml/min. A temperature program of 80°C (2 min.) -4°C/min.-280°C was used.

I.1.8 Gas chromatography - mass spectrometry (GC-MS)

GC-MS analysis were performed on a VG Micromass 70-70H GC-MS-DS system. The Varian Series 3700 GC was fitted with a fused silica DB-5 capillary column (30 m x 0.3 mm i.d.). Helium (1.5 ml/min) was used as carrier gas and the injections were performed in splitless mode (1:15).
The GC oven was programmed from 40°C (1 min) to 280°C at 4°C/min.

The branched/cyclic hydrocarbons were analysed by full data collection (m/z 45-450) at a scan time of 1 sec./decade and an interscan time of 0.50 secs. The mass spectrometers operated at 70eV electron energy with an ion source temperature of 200°C.

Data acquisition was performed using VG data system (PDP-11/24 based).

I.1.9 Preparation of kerogen concentrates for PY-GC-MS

The powdered and pre-extracted rock sample was treated overnight with concentrated HCl (200 ml), followed by treatment with hot 40% HF (100 ml, 50°C, overnight). The acids were removed by decanting and repeated washing with hot water (2 hours), 10% ammonium carbonate solution (>2 hours), and cold water (2x2 hours).

The kerogen was further purified by extraction with methanol, methanol/DCM (1:1) and hexane/DCM (1:1).

I.1.10 Flash pyrolysis-GC-MS (PY-GC-MS)

Flash Py-GC-MS was performed on a Chemical Data Systems (CDS) Pyroprobe 120 connected to a Varian 3700 chromatograph. The MS-system was a VG 70-70H.

GC conditions:

Column: DB-5 fused silica, 30 m, 0.32 mm i.d., 0.25 micron film thickness.
Carrier gas: He, 1.5 ml/min.
Inlet split ratio: 1:15.

Temperature program:

Full scan analysis (FS): 40°C (1 min.) - 4°C/min. - 280°C (20 min.).

A suspension of kerogen in methanol was applied to the platinum ribbon probe and the solvent was evaporated. The probe was then inserted into the

pyrolysis chamber and heated in a stream of helium to 600°C (ramp time 5-10 ms) for 5 sec. The pyrolysis chamber and interface were kept at a temperature of 300°C.

The mass spectrometer operated at 70eV electron energy with an ion source temperature of 200°C and at a pressure of 10^{-5} mBar. Full data collection was performed at a scan time of 1 sec./decade.

I.1.11 Vitrinite Reflectance measurements

Vitrinite reflectance measurements were carried out on whole-rock samples as follows: the rock samples were broken up if necessary, and mounted in a fast-setting synthetic resin or alternatively in wax (brown coals). Temperatures in excess of 50°C were avoided as these can result in alteration of the organic material. Once the resin was set, the sample plugs were ground on coarse silicon carbide paper in order to expose an area of sample for polishing. The samples were then ground on 600 and 280 grade silicon carbide paper to remove any coarse scratches.

Where clastic sediments were involved, grinding and polishing was carried out using propan-2-ol to avoid swelling of any clay minerals in the sample. If coals were to be measured, then water was used.

After coarse grinding, the samples are polished on Selvyt-covered laps using 5/20 and gamma grade alumina powder. Following polishing, the surface of the sample plugs was carefully cleaned to remove any traces of the polishing powders.

Reflectance measurements were carried out using a Leitz MPV-Compact microscope and photo-multiplier combination. The measurements were made under oil immersion, using an oil with a refractive index of 1.518 at a wavelength of 546 nm. The surface of the sample was examined for suitable vitrinite particles, and measurements were taken on these. The reflectance of a vitrinite particle was determined relative to an optical glass standard with a known reflectance of a similar order to that of the sample.

If possible, a minimum of twenty reflectance measurements was taken on each sample. Coals and carbonaceous claystone samples provide the most reliable data, whereas sandstones and carbonates provide the least reliable results.

I.1.12 Evaluation of kerogen composition and thermal maturity (TAI or SCI) in transmitted light

The rock samples were crushed and treated with hydrochloric acid and hydrofluoric acid in order to remove the mineral matter and isolate the kerogen. The isolated kerogen was mounted in glycerine jelly on microscope slides as a strew-mount.

The treatment of the isolated kerogen varied according to the requirements and preservation of the samples. This included:

T-slide: total acid residue.
Si-slide: sieved residue.

Si-slides were required if it was necessary to concentrate larger kerogen fragments or spores/pollen for "spore" colouration and/or age determination, respectively.

The samples were examined using a Leitz Dialux microscope with a white halogen light source. Objective lenses of 10x and 63x magnification were used. The higher magnification allowed a more detailed description of the kerogen, with resolution down to 2µm diameter.

Thermal alteration indices (TAI or SCI) were measured from the colour of spores and pollen, but preferentially on bisaccate pollen. The techniques used for this are adapted from Staplin (1969) and Burgess (1974). IKU has used a 1-10 scale for thermal alteration index (TAI)/Spore colouration index (SCI) since December, 1986.

Description of total acid resistant organic material in transmitted light, microscopy of total residues

The organic matter has been subdivided into descriptive groups according to morphology and chemical characteristics.

1. Amorphous = degraded, unstructured material of unspecified chemical nature.

2. Algal material = recognizable algal particles including prasinophycean palynomorphs (type I kerogen).
3. Liptinitic material = recognizable spores, pollen, cuticles and marine phytoplankton (type II kerogen).

4. Woody material = structured and unstructured woody tissues (type III kerogen).

5. Coaly material = black reworked or oxidized material (type IV kerogen).

I.1.13 UV-fluorescence of liptinite

The samples were investigated by microscopy in reflected transmitted or reflected light. The samples were also examined in ultra-violet light in order to determine the composition and colour of the fluorescent material present in the sample. The colour of certain liptinite macerals in ultra-violet light can be related to the thermal maturity of the sample. In addition the proportion of fluorescent amorphous organic matter in total amorphous kerogen was determined.

I.1.14 Preparation of kerogen concentrates for measurements of $^{13}C/^{12}C$ and D/H stable isotope ratios

The powdered and pre-extracted rock sample was treated overnight with concentrated HCl (200 ml), followed by treatment with hot 40% HF (100 ml, 50°C, overnight). The acids were removed by decanting and repeated washing with hot water (2 hours), 10% ammonium carbonate solution (>2 hours), and cold water (2x2 hours). Then, the kerogen concentrates were dried in a vacuum oven.

I.1.15 $\delta^{13}C$ and δD stable isotope analyses on kerogen concentrates

The isotope analyses were performed by mass spectrometry at IFE.

The kerogen concentrates were combusted in a vacuum combustion system filled with copper dioxide, at 960°C for 5-10 minutes. The combustion products CO_2 and H_2O were separated and purified. H_2O was reduced by zinc at 900°C for determination of δD.

The isotope ratios are given as delta values (del):

$$\text{del (\%)} = ((R_{sample} - R_{stand.}) / (R_{stand.})) * 1000$$

$^{13}C/^{12}C$-isotope ratios are calculated versus PDB.
D/H-isotope ratios are calculated versus SMOW.

IFE's reference value for the standard NBS-22 is -29.77±0.660/oo PDB.

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I.2 Interpretation levels

I.2.1 Total organic carbon

TOC (wt%)	Richness of source rock
<0.5	Poor Source Rock
0.5-1	Fair Source Rock
1-2	Good Source Rock
>2	Rich Source Rock

I.2.2 Rock-Eval pyrolysis

a) **Data Supplied**

S1	Free hydrocarbons (mg/g rock).
S2	Potential or pyrolysable hydrocarbons of kerogen (mg/g rock).
S3	Oxygen content of kerogen (mg CO_2/g rock).
Hydrogen Index	S2/TOC x 100 (mg hydrocarbons/g TOC).
Oxygen Index	S3/TOC x 100 (mg CO_2/g TOC).
Petroleum Potential	S1+S2 (mg HC/g rock).
Production Index	S1/(S1+S2).
Tmax	Temperature at which the S2 peak is at maximum (°C).

b) **Interpretation**

Kerogen type	Hydrogen Index (mg HC/g TOC)
Type I	>650
Type II	400-650
Type II/III	200-400
Type III	50-200
Type IV	<50 and up to 100 where oxygen index is very high.

N.B.

Hydrogen and particularly oxygen indices are affected by organic carbon and carbonate mineral contents. Thus decreasing TOC contents, where the same organic matter type is present, can result in reduced hydrogen and increased oxygen indices (Katz 1983 and Espitalié et al. 1984). Hence oxygen indices are not used.

Petroleum Potential	S1+S2 (mg HC/g rock) *)
Poor	<1
Fair	1-5
Good	5-10
Rich	>10

S1 and S2 values can be raised by the presence of migrated bitumens.

Production Index	S1/(S1+S2) *)
Primary bitumen	<0.1
Generated or migrated hydrocarbons	0.1-0.5
Predominantly migrated Hydrocarbons or stain	>0.5

T_{max}

Variations in values can occur due to maturity, kerogen type, migrated bitumens or low S2 peaks. The following maturity boundaries are therefore only approximate.

Tmax (°C)	Maturity stages of type II kerogens	Equivalent vitrinite reflectance in coals (% Ro)
425	Immature	0.5
435		0.7
	Oil generation zone	
450		1.0
>450	Gas generation zone	

*) Only approximate guide and not intended to indicate absolute limits.

I.2.3 Extractable organic matter (or soluble bitumen)

a) **Data Supplied**

Weight of extracted rock	(g)
EOM extractable organic matter	(mg, mg/g of rock, mg/g TOC)
Sat saturated hydrocarbons	(mg, mg/g of rock, mg/g TOC, wt% of EOM)
Aro aromatic hydrocarbons	(mg, mg/g of rock, mg/g TOC, wt% of EOM)
HC/EOM = (Sat+Aro)/EOM	(wt%)
Non-HC/EOM	(wt%)
HC/non-HC x 100	
Sat/Aro x 100	

b) **Interpretation of source-rock richness based on hydrocarbon content.**

Hydrocarbon content is dependent on maturity, total organic carbon content and kerogen type as well as being influenced by migrated hydrocarbons. The values should therefore be treated as a rough guide only.

Source rock richness	HC (ppm of rock)
Poor	<100
Fair	100-250
Good	250-500
Rich	>500

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I.2.4 Some ratios calculated from gas chromatograms

Saturated hydrocarbons:

$$CPI\text{-}1 = \frac{1}{2}\left(\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}}\right)$$

$$CPI\text{-}2 = \frac{2 \times nC_{27}}{nC_{26} + nC_{28}}$$

$$A = pr/nC_{17}$$

$$B = phy/nC_{18}$$

$$A/B = (pr/nC_{17})/(phy/nC_{18})$$

Aromatics:

MPI 1 = methylphenanthrene index 1 $\quad 1.5 \times (3\text{-MP}+2\text{-MP})/(P+9\text{-MP}+1\text{-MP})$
MPI 2 = methylphenanthrene index 2 $\quad 3 \times 2\text{-MP}/(P+9\text{-MP}+1\text{-MP})$

I.2.5 Microscopy of organic matter in transmitted and reflected light

a) **Framework of hydrocarbon generation and destruction related to vitrinite or huminite reflectance:**

Approximate thresholds refer to oil prone kerogens and depend on type of organic matter.

Immature, biogenic gas:	Ro <0.45%
Marginally mature, onset of oil generation:	0.45< Ro <0.55%
Early oil window mature:	0.55≤ Ro <0.7%
Peak oil window mature:	0.8 ≤ Ro <0.9%
Late oil window mature/Early wet gas window:	0.9 ≤ Ro <1.35%
Late wet gas window:	1.35≤ Ro <2.0%
Dry gas window:	2.0 < Ro <4.0%

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Comparison of microscopic thermal maturation systems at IKU

SPORE COLOUR	VITRINITE REFLECTANCE		SPORINITE FLUORESCENCE
TAI	NEW TAI (SCI)	%	
1 - 2-	1.0- 3.5	0.25-0.40	1-4
2- - 2	3.5- 4.0	0.40-0.60	4-6
2 - 2+	4.0- 4.5	0.60-0.80	6-7
2+ - 3-	4.5- 5.5	0.80-1.00	7-8
3- - 3	5.5- 6.0	1.00-1.20	8-9
3 - 5	6.0-10.0	<1.20	Absent

At IKU, TAI determination is generally undertaken on bisaccates.

Relation between fluorescence colour and sporinite fluorescence zones:

EXC. 400 nm
BAR. 530 nm

colour	G	G/Y	Y	Y/O	L.O	M.O.	D.O.	O/R	R
zone	1	2	3	4	5	6	7	8	9

SECTION II

COMMENTS ON ANALYTICAL RESULTS

PEAK IDENTIFICATIONS IN GC-MS AND PY-GC-MS

MASS CHROMATOGRAMS

II.

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II.1 Contaminants

II.2 Data quality

II.3 Comments on selection of samples for follow-up analyses. Correlation between screening an follow-up results.

II.4 Comments on MPLC separation results, the backflush problem.

II.5 Peak identification in GC-MS and PY-GC-MS mass chromatograms.

II.6 Description of pyrolysis-GC-MS results for the Spekk and Lange Formations in cores 6307/07-U-03A and 6307/07-U-02.

II.1 Contaminants

No important contaminants have been identified in extracts and pyrolysates.

II.2 Data quality

II.2.1 General comments

The quality of the data from the extensively analysed Upper Jurassic -lowermost Cretaceous section in cores 6307/07-U-03A and 6307/07-U-02 is generally very good.

The cores in quadrant 6206 contain low or negligible concentrations of organic matter. Thus, the analytical results from these cores are less reliable, except the quality of the huminite reflectance measurements, which is often good.

The data from the carbonaceous interval between 30.85 and 30.00 m in core 6408/12-U-01 are of good quality. Other parts of the core contain low concentrations of organic matter and so have no reliable analytical results.

II.2.2 Quality of pyrolysis-GC-MS

Several samples were analysed in duplicate and triplicate (E-619). The resulting mass chromatograms showed reproducibilites comparable to ordinary pyrolysis-GC chromatograms. Small variations in calibration of the instrument could, however, lead to differences in response between the high and low molecular weight range of the mass chromatograms. It is thus advisable to calculate component ratios for peaks eluting close to each other.

Difference in detector response for different compound types is a problems when complex mixtures are analysed by mass spectrometry. Lack of internal standard(s) in these experiments lead to extensive use of compound ratios. This means that the calculated ratios must not be used to ascribe relative concentrations to the different compounds in each sample, but rather for comparison between different samples.

II.3 Correlation between screening and follow-up results

Larger samples (about 80 g) had to be selected for the follow-up analyses

to achieve high signal/noise ratios for the various analytical results. These larger samples were subjected to Rock-Eval pyrolysis and determination of TOC to ensure that there was no major difference between the organic content of the subsamples selected for follow-up analyses and those from screening analyses.

Owing to technical problems, the Rock-Eval pyrolyses on the larger, follow-up subsamples had to be undertaken by another external laboratory. The S_1 and S_2 values from the Rock-Eval pyrolysis on the larger samples are often much lower than those of the corresponding screened samples. The sample for follow-up analyses were usually selected from intervals that, according to the previous screening analyses, appeared to be homogeneous. Hence the extremely reduced S_1 and S_2 values measured in the external laboratory could be due to an erronous run rather than the influence of poorer, more terrestrially influenced source rocks in the larger samples selected for follow-up analyses.

If the latter alternative is the case, then all kerogen parameters from the screening analysis could be extensively affected. However, immature oil prone source rocks have a larger content of extractable compounds, especially terpenoids, steroids and pigment derivatives in general. Thus, the extract parameters will be largely influenced by the richest, most oil prone source rocks in the samples. The same reasoning can be applied to the total pyrolysate from PY-GC-MS, but is not applicable to groups of compounds that are particularly enriched in terrestrial kerogens (phenols, certain arenes etc).

In conclusion, the extract results are those probably largely affiliated with the most oil prone source rocks, as inferred from the TOC determination and Rock-Eval pyrolysis screening. However, a direct correlation between kerogen and extract parameters could be difficult due to the possibly heterogenous nature of the samples selected for follow-up analyses.

II.4 Comments on MPLC separation results, the backflush problem

In the maltene fraction from core 6307/07-U-03A and occasionally in core 6307/07-U-02 the MPLC(/RI) trace shows three eluting peaks, of which the second peak elutes immediately after the first peak. The content of the second peak was unknown.

Two MPLC runs were carried out on the maltenes from sample E-646 which had

three eluting peaks. In the first run the backflush was performed immediately after elution of the first peak ("early backflush"), whereas in the second run the backflush was performed after elution of the second peak, but before the third peak. In both cases, the fraction eluting after the backflush ("the aromatic fraction") was investigated by GC-MS (TIC) to ensure that this fraction contained no alkanes and alkenes, i.e. that these compounds eluted in the first fraction.

It can be concluded from Figure II.4.1 and Table II.4.2 that the content of the total aromatics and the monoaromatized steranes in the fractions eluting after "early" and "late" backflush is fairly similar. Furthermore, investigations of specific mass chromatograms from these fractions show negligible concentrations of alkanes and alkenes. Thus, the content of the second peak in the MPLC (RI) trace remains unknown. However, it can be suggested tentatively from the immaturity of the extracts that this peak contains high concentrations of compounds with functional groups together with long alkyl or alkenyl chains responsible for the low polarity of the compounds. The "late" backflush was preferentially carried out on all maltene fractions from the Møre-Trøndelag shallow cores.

Table II.4.2 *Intensity ratios of mass chromatograms and TIC. Major peaks.*

Mass chromatogram m/z	Compound type	E-646FS1 "early" backflush	E-646FS2 "late" backflush
97	alkenes/cyclic compounds	0.011	0.003
91	monoaromatic	0.011	0.013
105	"	0.010	0.012
106	"	0.008	0.011
119	"	0.025	0.067
120	"	0.008	0.009
159	"	0.037	0.050
173	"	0.117	0.296
211	ring A-monoarom.-steranes	0.008	0.009
253	ring C-monoarom.-steranes	0.069	0.079
141	C_1, C_2-naphthalenes	0.013	0.020
156	C_2-naphthalenes	0.013	0.012
183	Cadalene	0.095	0.287
237	Simonellite	0.032	0.045
189	Hopenes + ?	0.014	0.038
191	Hopanes	0.017	0.015
231	Alkenes/Triarom. steranes	0.006	0.004

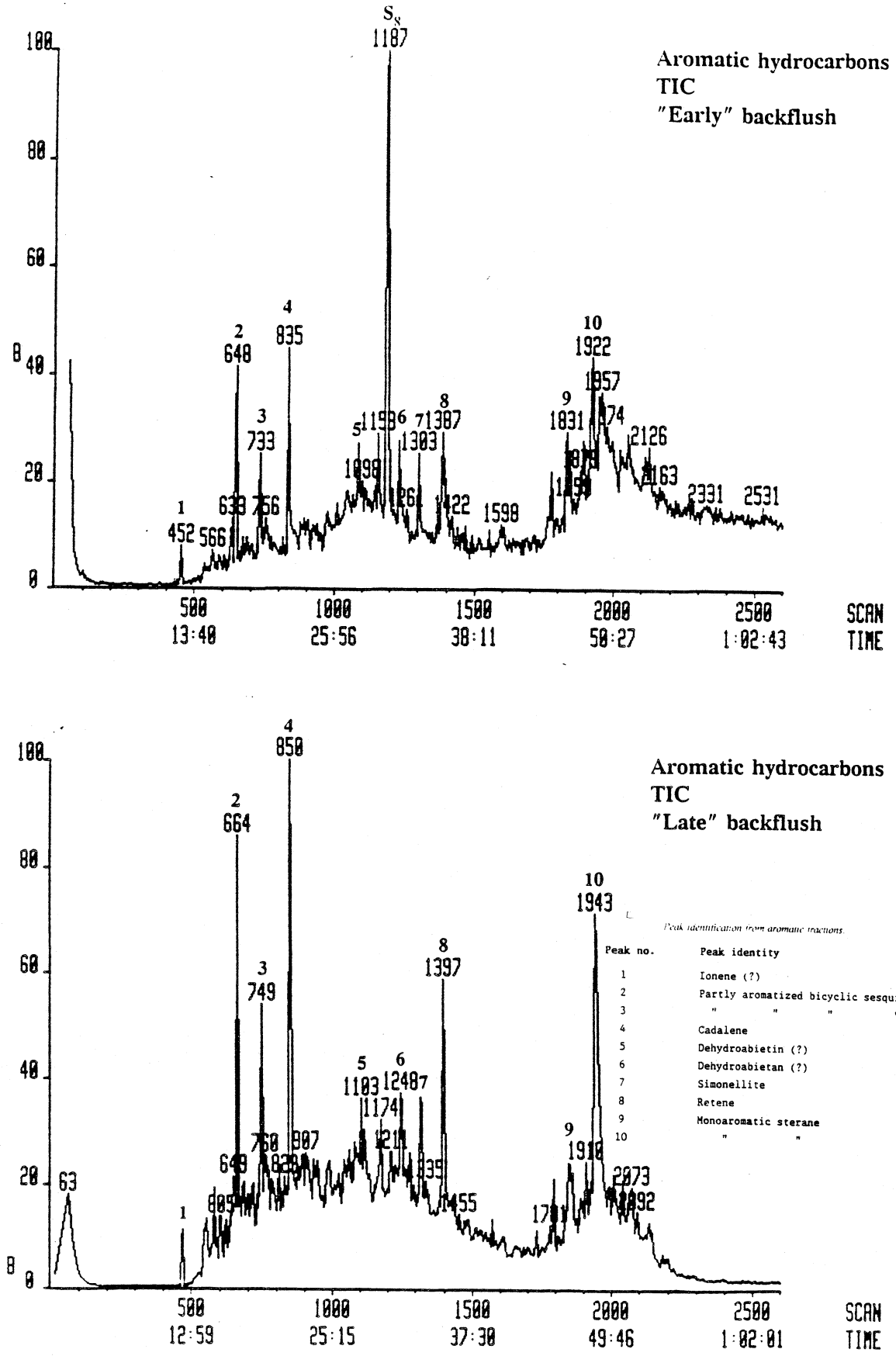
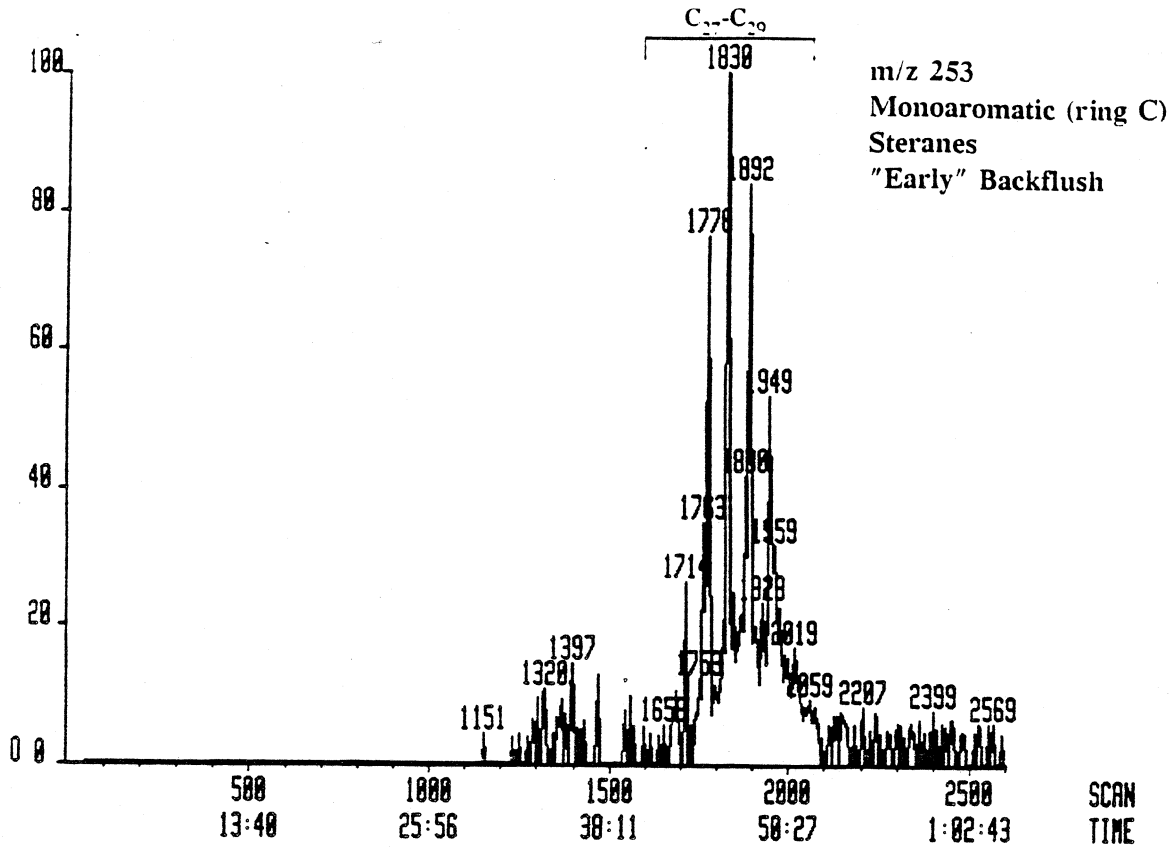


Figure II.4.1a GC-MS (TIC) results from fraction eluting after MPLC backflush. "Late" and "early" backflush on maltenes from sample E-646.



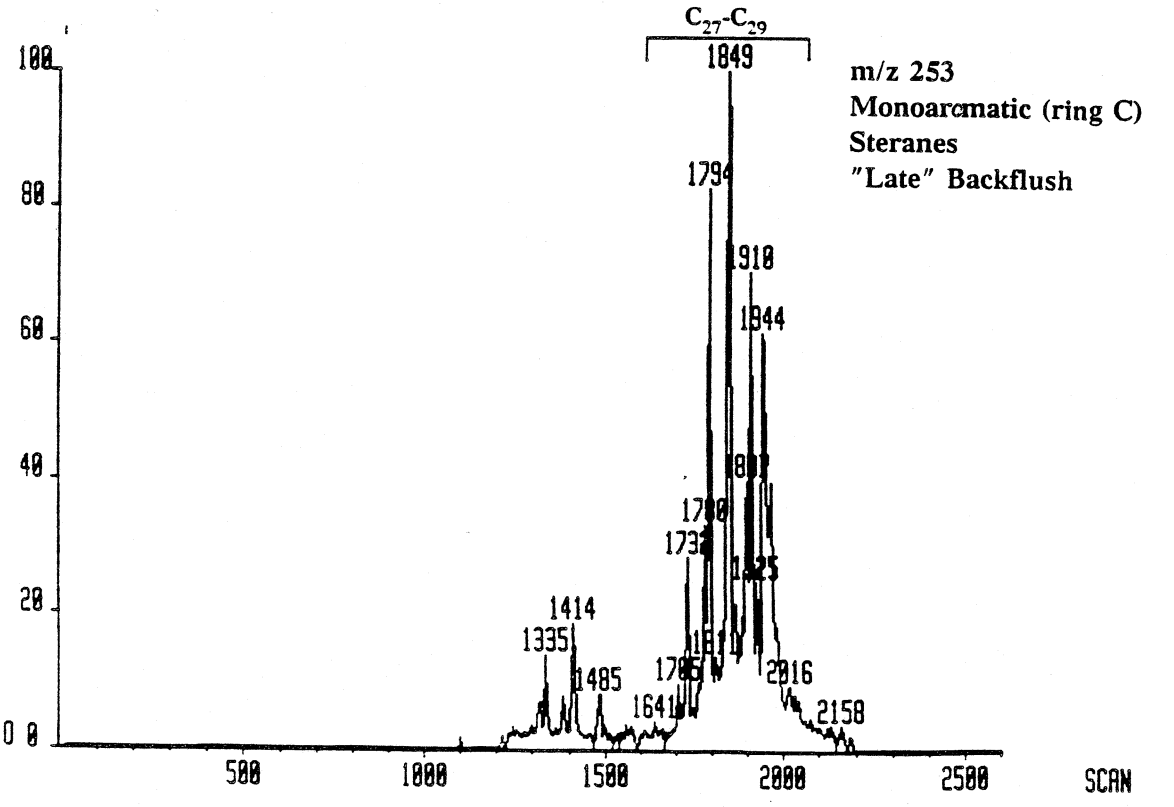


Figure II.4.1b GC-MS results showing the monoaromatics in the fraction eluting after MPLC backflush. "Late" and "early" backflush on maltenes from sample E-646.

II.5 Peak identification in GC-MS and PY-GC-MS mass chromatograms.

II.5.1 Peak identification in GC-MS-MS chromatograms. Branched/cycloalkane fractions.

This chapter describes peak identification in the various mass chromatograms. Most of the samples are overall similar, and the most general patterns are referred in this chapter. Peak numbers in all the tables refer to the respective mass chromatograms. Individual differences of some of the samples are described together with the discussion of the actual samples. Most of the discussion represent sample E-646 (47.56 m) from the Spekk Formation sub-unit 2 in core 6307/07-U-02.

Total ion chromatograms (TIC)

The TIC's generally contain two main groups of compounds, the normal isoprenoids of carbon numbers C_{16} to C_{21} and the tetra- and pentacyclic steroids and triterpenoids mainly with carbon numbers from C_{27} to C_{31}. Some individual variations in the relative amounts of the two groups exist, but these variations should be used with care. Mass spectrometer calibration can change this picture, since the first group contains mainly low molecular weight fragments and the second group has higher molecular weight fragments. A typical TIC is shown in Figure II.5.1, and the main compounds have been listed in Table II.5.1.

Table II.5.1 Peaks identified in total ion chromatogram (TIC). Branched/cyclic fraction of E-646

Peaks no.	Identification
1.	C_{14}-Bicyclic sesquiterpane (?)
2.	C_{14}-Bicyclic sesquiterpane (?)
3.	Cyclohexane with C_8 aliphatic chain, $C_{14}H_{28}$
4.	$C_{16}H_{34}$-Isoprenoid
5.	Cyclohexane with C_9 aliphatic chain, $C_{15}H_{30}$
6.	$C_{18}H_{38}$-Isoprenoid
7.	$C_{19}H_{40}$-Isoprenoid, Pristane
8.	$C_{20}H_{42}$-Isoprenoid, Phytane
9.	$C_{21}H_{44}$-Isoprenoid
10.	tetra- and pentacyclic steroids and triterpenoids

Δ isoprenoids
* Cyclohexane with aliphatic chain
· C_{14} bicyclic sesquiterpanes (?)
hopenes/hopanes
o rearranged sterenes

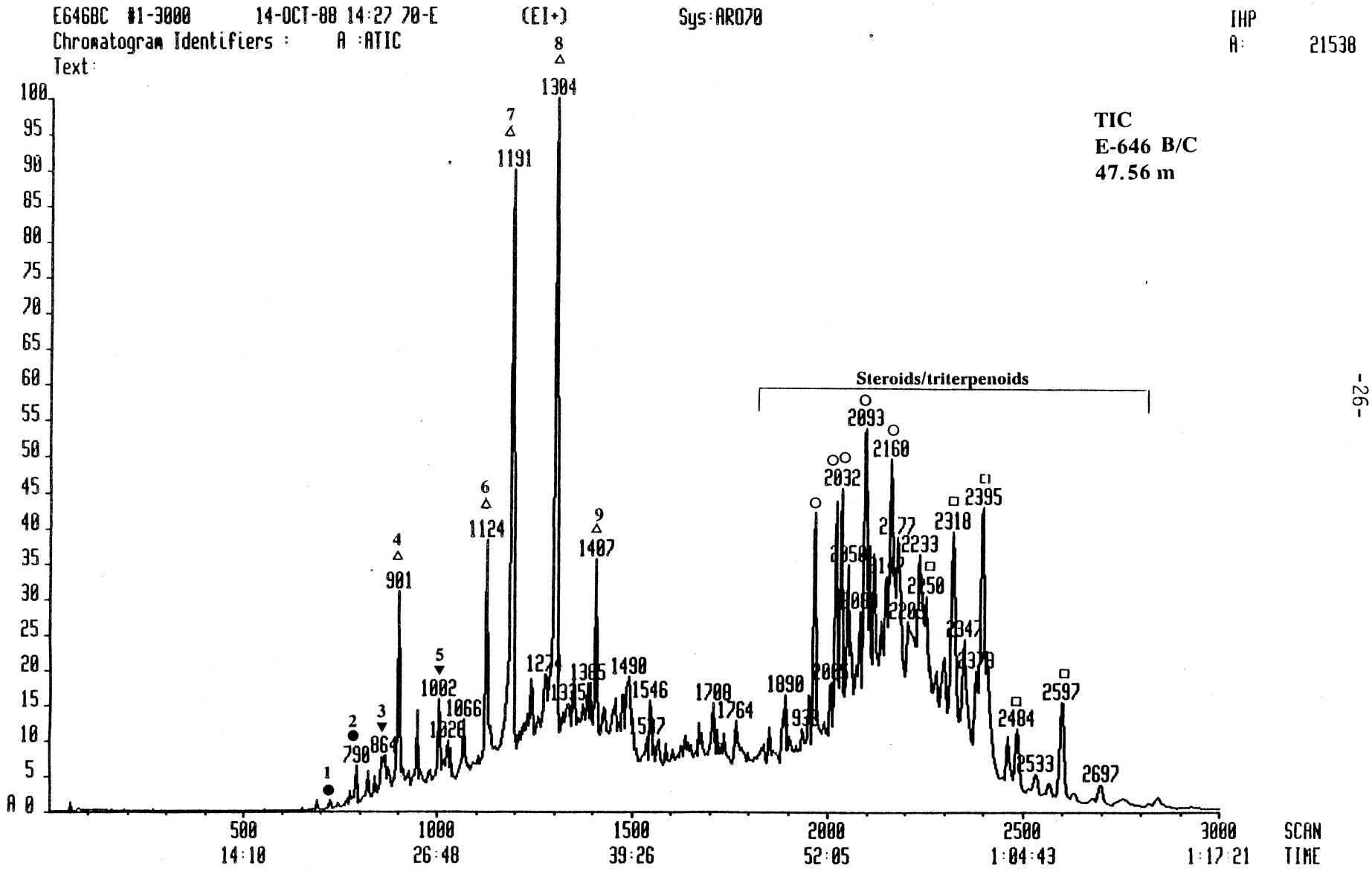


Figure II.5.1 Example on a GC-MS TIC chromatogram typical for branched/cycloalkanes in the Spekk Fm extracts

M/z 97. Alkenes/Cyclic compounds.

The m/z 97 chromatograms show a complex pattern of peaks, but no peaks that are especially abundant, and no homologous series of peaks. The main peaks are the common isoprenoids, a fact showing that the alkenes are of low abundance. Figure II.5.2 shows a m/z 97 chromatogram.

M/z 99, 113 and 183. N-Alkanes and isoprenoids.

These three chromatograms are shown together in Figure II.5.3, since in the B/C-fractions these traces represent more or less the same compounds. M/z 113 and 183 are more spesific for the isoprenoids.

All three traces show that the main straight chain alkanes are represented by isoprenoids. The main compounds are listed in Table II.5.2. Pristane (C_{19}) and phytane (C_{20}) are the most abundant compounds together with C_{16}, C_{18} and C_{21} isoprenoids. In additon some more special compounds have been tentatively identified.

Table II.5.2 Peaks identified in m/z 99, 113 and 183. Branched/cyclic fraction of sample E-646.

Peak no.	(scan)	Identification
4	(901)	$C_{16}H_{34}$ Isoprenoid
6	(1124)	$C_{18}H_{38}$ Isoprenoid
7	(1192)	$C_{19}H_{40}$ Isoprenoid, Pristane
8	(1304)	$C_{20}H_{42}$ Isoprenoid, Phytane
9	(1407)	$C_{21}H_{44}$ Isoprenoid

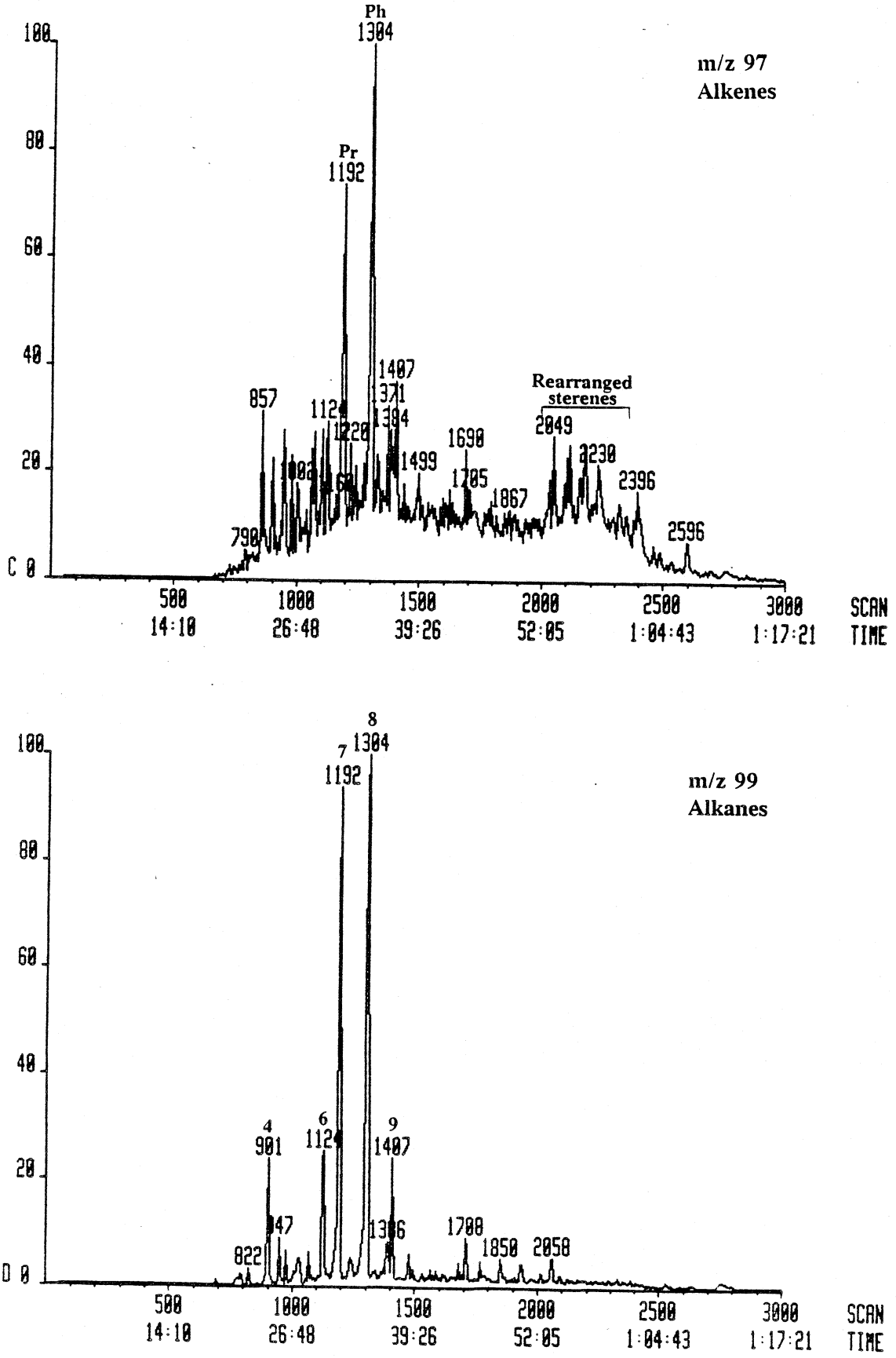


Figure II.5.2 Example on GC-MS chromatograms of alkenes and alkanes. E-646 from 47.56 m in core 6307/07-U-02.

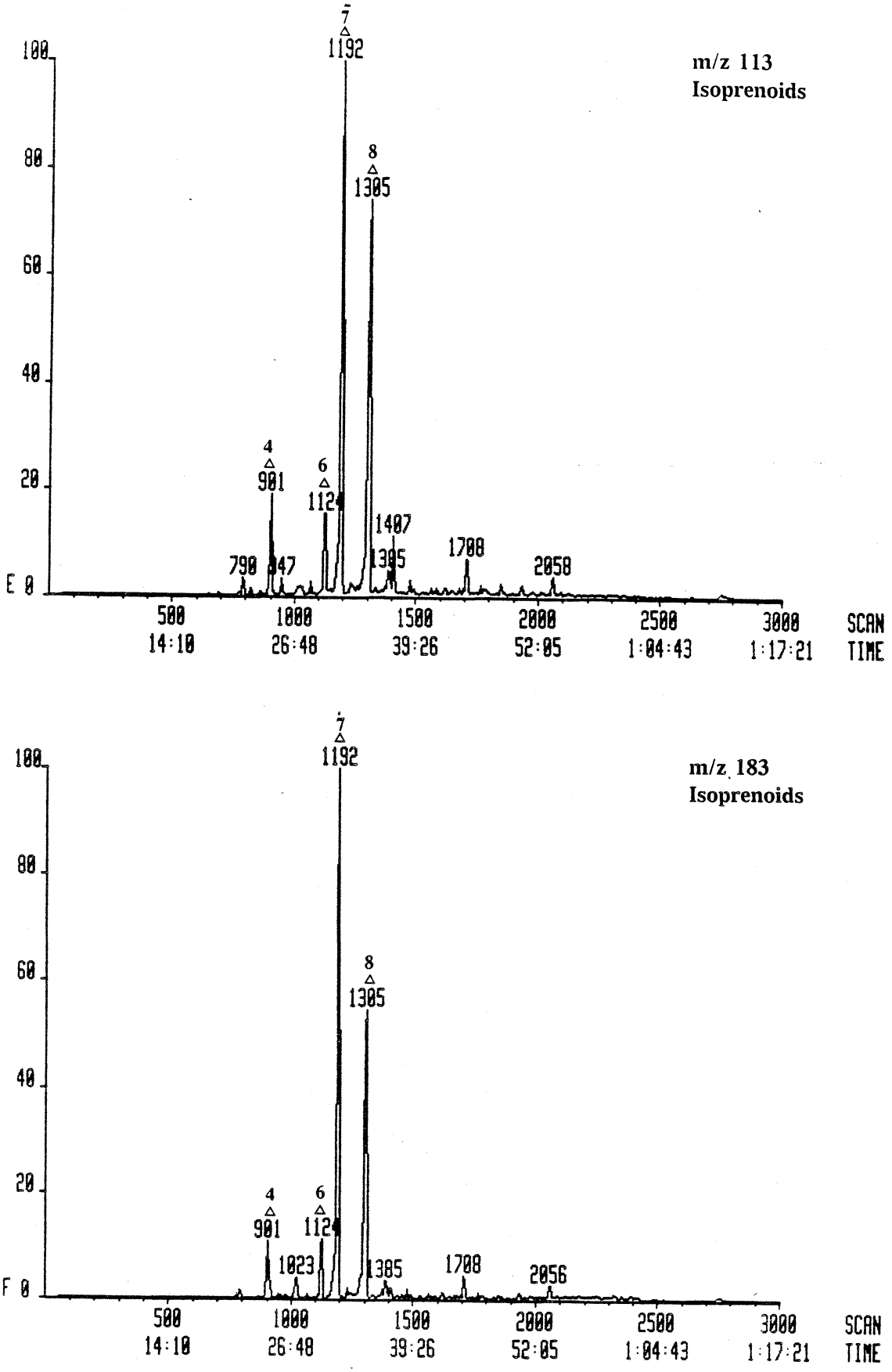


Figure II.5.3 Example on GC-MS chromatograms of isoprenoids. E-646 from 47.56 m in core 6307/07-U-02.

M/z 191. Tri-, tetra- and pentacyclic terpenoids.

A m/z 191 chromatogram that includes the whole molecular weight range is shown in Figure II.5.4. This shows that the pentacyclic hopanoid compounds in the scan range 2000-3000 are the major compounds, whereas the tri- and tetracyclic range (scans 800-1600) is less abundant.

The scan range 800-1600 is normalised and presented in Figure II.5.4. Mass spectra have given molecular ions in addition to the major fragment ion m/z 191, and the peak identification is presented in Table II.5.3. There turns out to be one series of tricyclic and one series of tetracyclic compounds, extending in carbon numbers only from C_{18} to C_{20}. It is possible, but unlikely, that the tetracyclic series could be tricyclic compounds containing one ring A or B double bond. However, this would be expected to give a stronger m/z 189 fragment than those seen in the m/z 189 trace of this range.

Table II.5.3 *Tri- and tetracyclic terpenes identified in m/z 191. Branched/cyclic fraction of sample E-646.*

Peak no.	(scan)	Identification
1	(1109)	$C_{19}H_{32}$ tetracyclic (molecular ion m/z 260)
2	(1160)	$C_{19}H_{32}$ ---- " ----
3	(1273)	$C_{18}H_{32}$ + $C_{20}H_{36}$ tricyclic (molecular ion m/z 248 and 276)
4	(1317)	$C_{20}H_{34}$ tetracyclic (molecular ion m/z 274)
5	(1422)	$C_{19}H_{34}$ tricyclic (molecular ion m/z 262)
6	(1500)	$C_{20}H_{36}$ tricyclic (molecular ion m/z 276)

· tetracyclic compounds

* tricyclic compounds

Scan range 1800-3000 covering the pentacyclic hopanoids is normalised in Figure II.5.4. The compounds in this figure have been identified mainly from their mass spectra and relative retention times. To aid in the identification a standard mixture with four commercial hopenes/hopanes was run, in addition to the information from m/z 163 and 177 (C_{28} and C_{29} hopanes), m/z 189 (hopenes) and molecular weight profiles.

The major compounds in the trace are seen to be hopenes and 17β(H), 21β(H)-hopanes in the range of C_{27} to C_{33}. In the table of identified compounds (Table II.5.4) some minor compounds have been listed, even though they can not be seen in m/z 191. In some samples, for instance, some hopenes can be seen in the m/z 189 trace, but hardly in the m/z 191 trace.

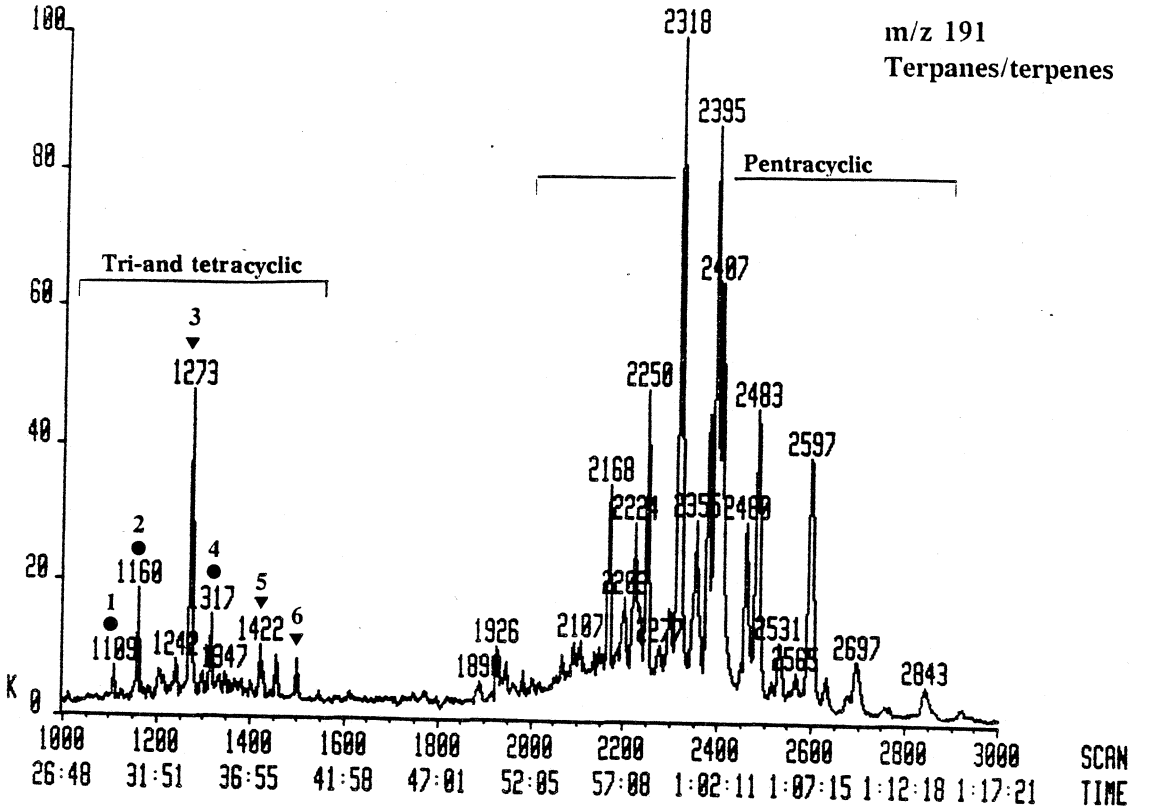
Table II.5.4 Pentacyclic compounds identified in m/z 191.
Branched/cyclic fraction of sample E-646.

Peak no.	(scan)	Identification
1	(2168)	C_{27} hopene ($C_{27:1}$)
2	(2203)	18α(H)-trisnorneophane, T_s (?) ($C_{27:0}$)
3a	(2221)	trisnor-hop-$\Delta^{17(21)}$-ene ($C_{27:1}$)
3	(2224)	17α(H)-trisnorhopane, Tm ($C_{27:0}$)
4	(2250)	17β(H)-trisnorhopane, ~~Tm~~ ($C_{27:0}$)
5	(2318)	nor-hop-$\Delta^{13(18)}$-ene ($C_{29:1}$)
5a	(2320)	17α(H), 21β(H)-norhopane ? ($C_{29:1}$)
6	(2348)	hop-$\Delta^{17(21)}$-ene ($C_{30:1}$)
7	(2355)	17β(H), 21α(H)-norhopane ($C_{29:0}$)
8	(2379)	17α(H), 21β(H)-hopane ($C_{30:0}$)
9	(2395)	hop-$\Delta^{13(18)}$-ene ($C_{30:1}$)
10	(2407)	17β(H), 21β(H)-norhopane ($C_{29:0}$) + 17β(H), 21α(H)-hopane ($C_{30:0}$)
10a	(2410)	homo-hop-$\Delta^{17(21)}$-enes ($C_{31:1}$)
10b		
11	(2460)	17α(H), 21β(H)-homohopane ($C_{31:0}$)
12a	(2485?)	homohop-?-ene ($C_{31:1}$)
12	(2483)	17β(H), 21β(H)-hopane ($C_{30:0}$)
13	(2597)	17β(H), 21β(H)-homohopane ($C_{31:0}$)
14	(2697)	17β(H), 21β(H)-bishomohopane $C_{32:0}$)
15	(2843)	17β(H), 21β(H)-trishomohopane ($C_{33:0}$)

· hopenes
* 17α(H)-hopanes
Δ 17β(H)-hopanes

The difficulties in this identification are to decide if the main hopane isomers present 17β(H), 21β(H)- or 17β(H), 21(H)-isomers and if the hopene double bond is $\Delta^{13(18)}$ or $\Delta^{17(21)}$. The main isomers are alternating determined to be 17β(H), 21β(H)-hopanes and $\Delta^{13(18)}$-hopenes.

No abundant peak representing C_{28} bisnorhopane is seen. This compound has been observed in previous studies on the Helgeland coast off Norway



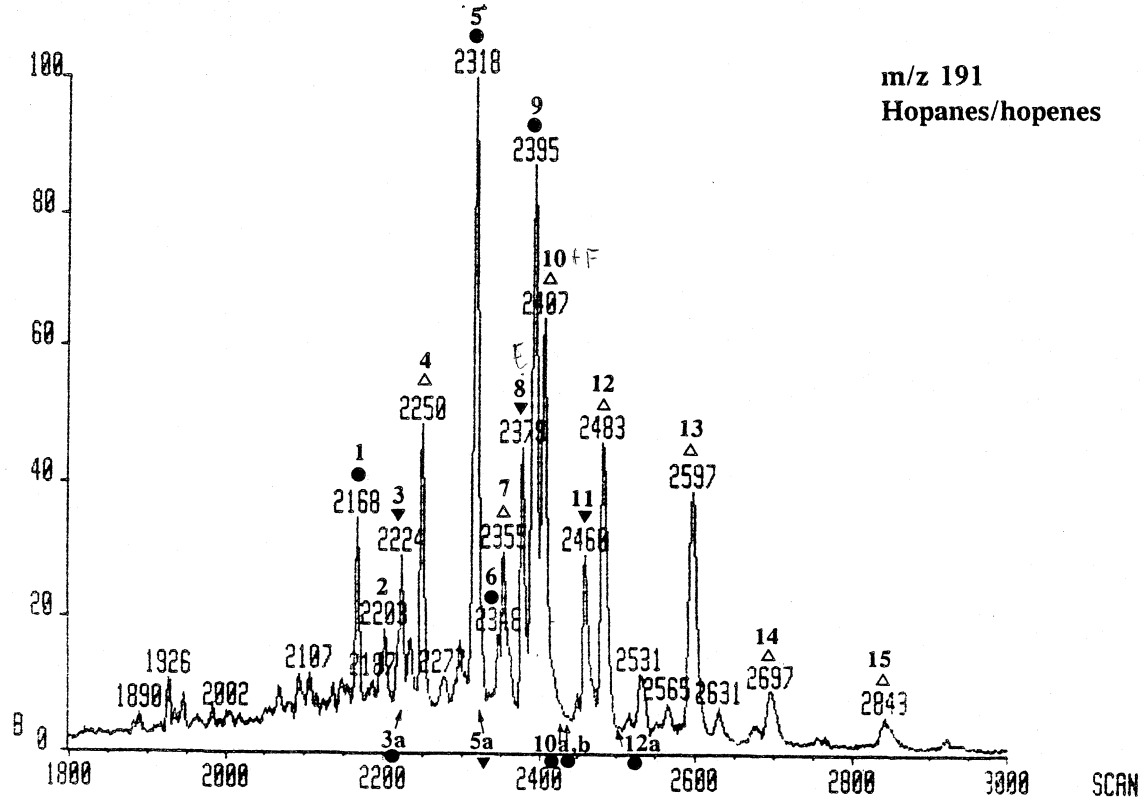


Figure II.5.4 Example on GC-MS chromatograms of terpanes/terpenes and hopanes/hopenes.E-646 from 47.56 m in core 6307/07-U-02.

M/z 217. Steranes.

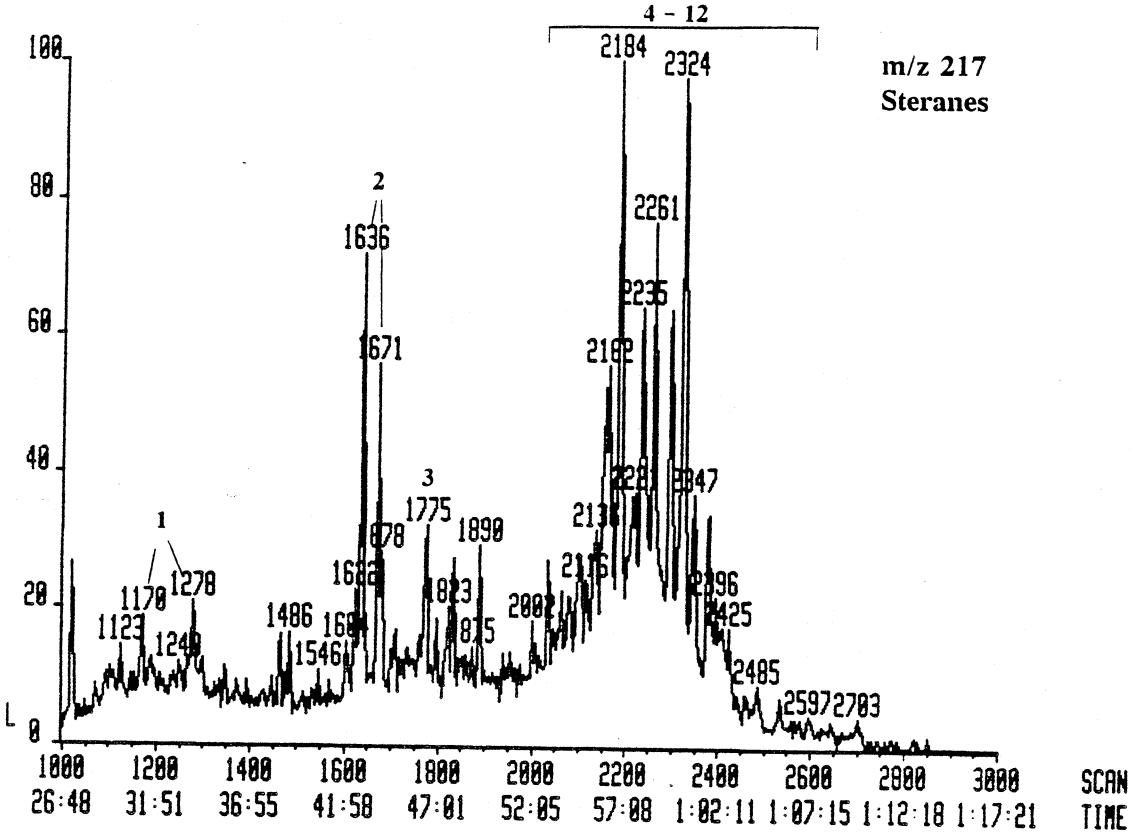
The m/z 217 mass chromatogram in Figure II.5.5 shows steranes from C_{19} to C_{30}, with the regular C_{27} to C_{29} steranes as the most abundant. Figure II.5.5, lowermost chromatogram, presents the C_{27}-C_{30} regular steranes in an extended view. This shows that no rearranged steranes are present. A list of identified compounds is presented in Table II.5.5. The identification is based on mass spectra, relative retentation times and mass chromatograms representing 14β(H), 17β(H)-steranes (m/z 218) and molecular ions.

Table II.5.5 *Peak identification in m/z 217 chromatogram. Branched/cyclic fraction of sample E-646.*

Peak no.	(scan)	Identification
1	(1170/1278)	5α +5β-androstanes, $C_{19}H_{32}$
2	(1636/1671/1678)	pregnanes, $C_{21}H_{36}$
3	(1775)	$C_{22}H_{38}$
4	(2158?)	5β(H), 14α(H), 17α(H)-C_{27} sterane (C_{27}-βαα)
5	(2162)	C_{27} sterene ($C_{27:1}$)
6	(2184)	5α(H), 14α(H), 17α(H)-C_{27} sterane (C_{27}-ααα)
7	(2235)	5β(H), 14α(H), 17α(H)-C_{28} sterane (C_{28}-βαα)
8	(2261)	5α(H), 14α(H), 17α(H)-C_{28} sterane (C_{28}-ααα)
9	(2300?)	5β(H), 14α(H), 17α(H)-C_{29} sterane (C_{29}-βαα)
10	(2324)	5α(H), 14α(H), 17α(H)-C_{29} sterane (C_{29}-ααα)
11	(2347)	5β(H), 14α(H), 17α(H)-C_{30} sterane (C_{30}-βαα)
12	(2375?)	5α(H), 14α(H), 17α(H)-C_{30} sterane (C_{30}-ααα)

° ααα steranes

* βαα steranes



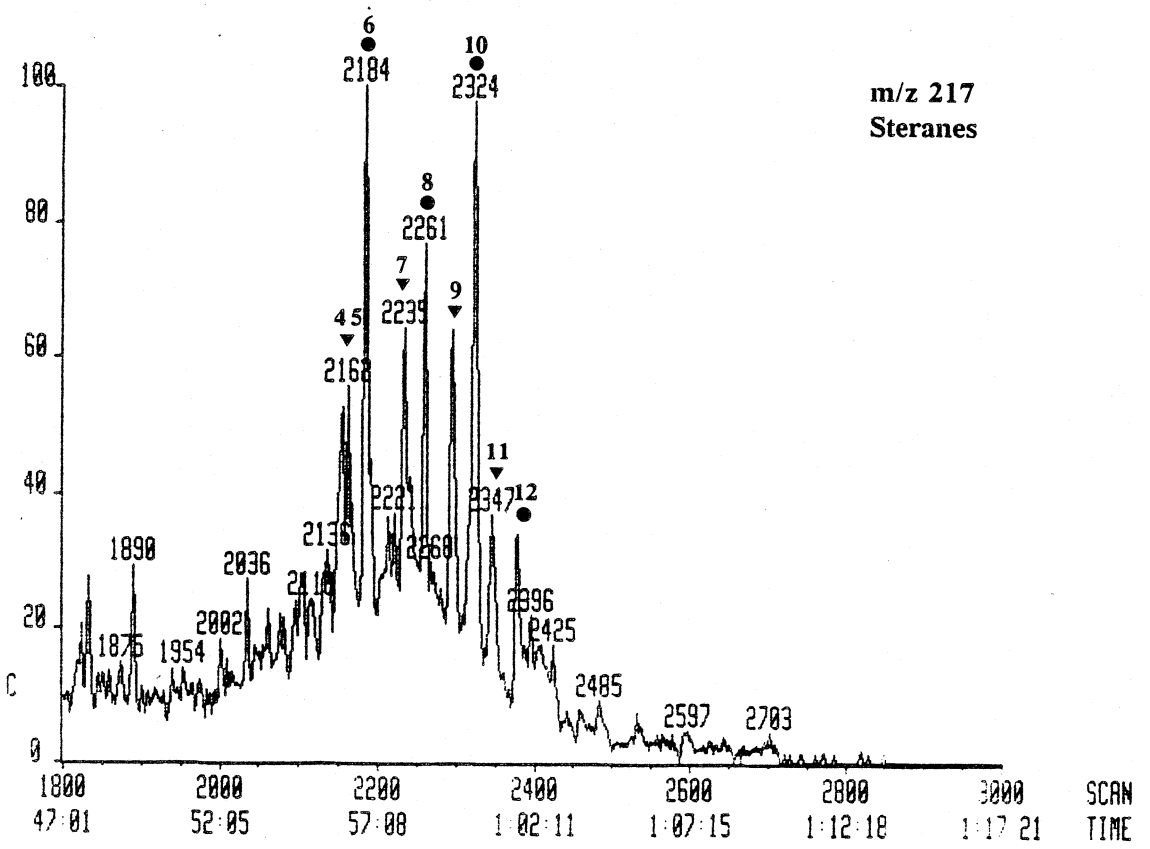


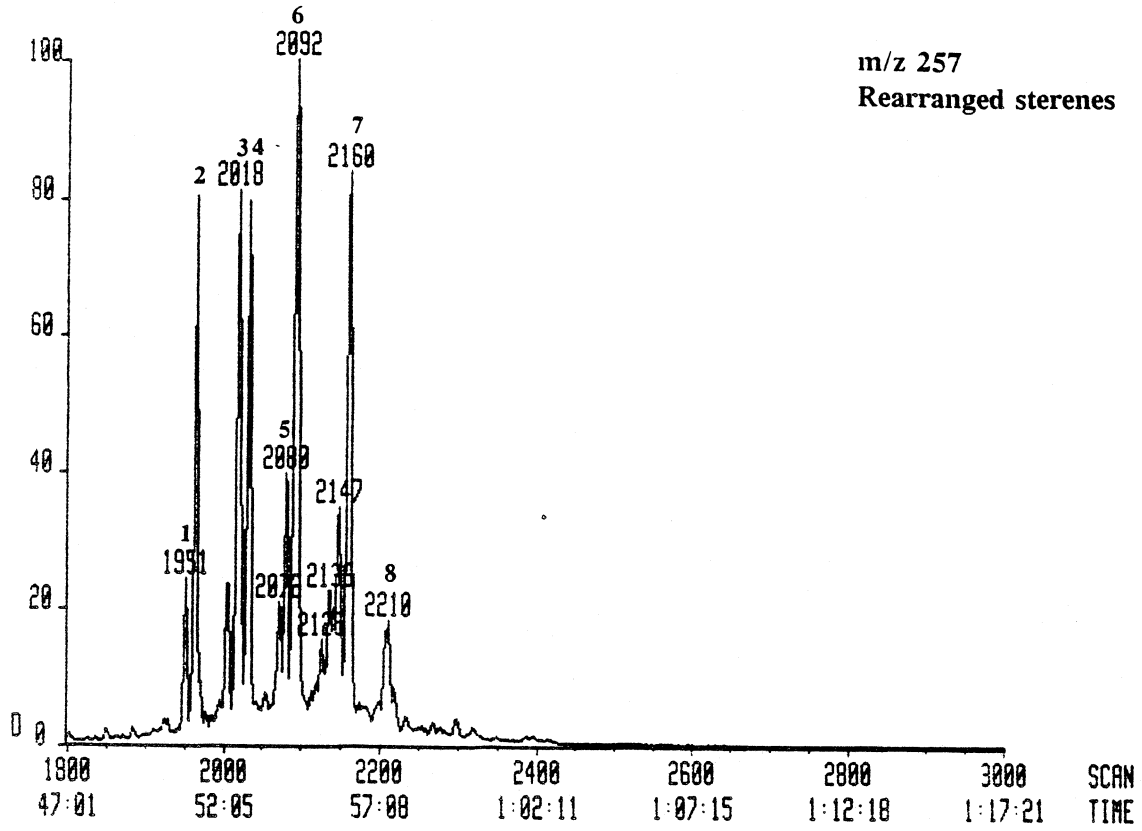
Figure II.5.5 C_{19}-C_{30} steranes. Example from E-646 (47.56m) in core 6307/07-U-02, Spekk Fm sub-unit 2.

M/z 259 and 257. Rearranged steranes and sterenes.

Rearranged steranes are normally seen in m/z 259 and 217. As discussed above hardly any rearranged steranes are detected in the m/z 217 trace. Poor signal to noise ratios in the m/z 259 traces are therefore not surprising, and the mass spectra show that the peaks represent rearranged sterenes with m/z 257 as the base peak. The m/z 257 mass chromatogram in Figure II.5.6 shows an improved signal to noise ratio although the peaks are the same as those seen in m/z 259. A list of compounds, rearranged sterenes from C_{27} to C_{31}, is given in Table II.5.6.

Table II.5.6 *Peak identification in m/z 257 (and 259). Branched/cyclic fraction of sample E-646.*

Peak no.	(scan)	Identification
1	(1951)	C_{27} rearranged sterene, ($C_{27:1}$)
2	(1960?)	---- " ----
3	(2018)	---- " ----
4	(2024?)	C_{28} ---- " ---- ($C_{28:1}$)
5	(2080)	---- " ----
6	(2092)	C_{28} + C_{29} rearranged sterenes ($C_{28:1}$ + $C_{29:1}$)
7	(2160)	C_{29} ---- " ---- ($C_{29:1}$)
8	(2210)	C_{30} ---- " ---- ($C_{30:1}$)



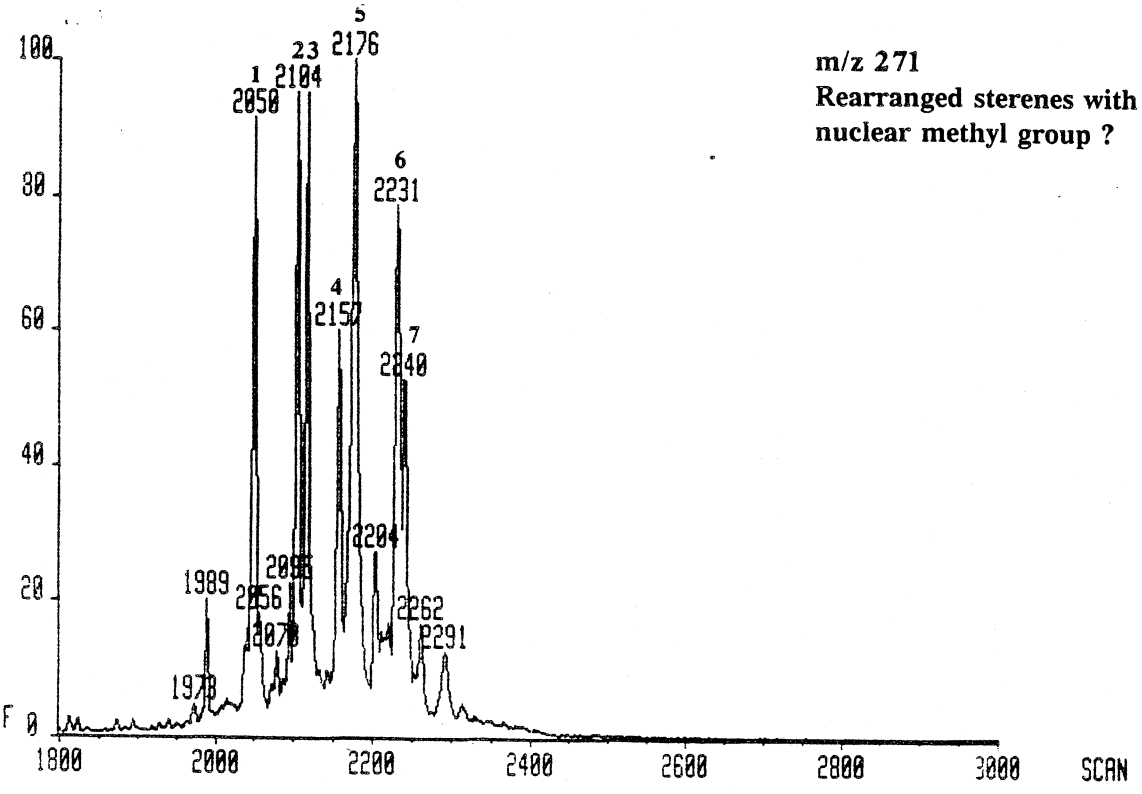


Figure II.5.6 Rearranged sterenes and possible rearranged sterenes with nuclear methyl group (m/z 271). Example from E-646 (47.56 m) in core 6307/07-U-02.

M/z 231. 4-Methyl-steranes

The m/z 231 mass chromatogram in Figure II.5.7 shows several peaks of similar abundance. The mass spectra of these peaks show that the peak at scan number 1136 is a $C_{18}H_{30}$ compound, which implies that this can not be a 4-Me-sterane, as a full sterane skeleton with three methyl groups requires at least $C_{20}H_{34}$. The next two peaks may represent 4-Me-steranes, $C_{20}H_{34}$ and $C_{22}H_{38}$, or homologues of the $C_{18}H_{30}$ compound. The rest of the peaks have molecular ions that indicate either double bonds and/or pentracyclic compounds. It is known that hopenes with $\Delta^{17(21)}$ have relatively abundant m/z 231, and thus three of the peaks can probably be identified to be hopenes by comparing with m/z 189 and 191.

An extra double bond in ring D or the side chain would still make it possible that the molecules had the basic structure of 4-Me-steranes. The peak identifications in Table II.5.7 are limited and tentative, and thus it is not possible to conclude confidently that the samples contain 4-Me-steranes/ sterenes.

Table II.5.7 *Peak identifications from m/z 231. Branched/cyclic fraction of E-646.*

Peak no.	(scan)	Identification
1	(1136)	$C_{18}H_{30}$ tetracyclic (molecular ion m/z 246)
2	(1338)	$C_{20}H_{34}$ ---- " ---- (" " m/z 274)
3	(1734)	$C_{22}H_{38}$ ---- " ---- (" " m/z 302)
4	(1890)	$C_{24}H_{40}$ (" " m/z 328)
5	(2056)	unidentified
6	(2152)	molecular ions m/z 366, 398?
7	(2221)	trisnor-hop-$\Delta^{12(21)}$-ene ($C_{27:1}$)
8	(2348)	hop-Δ-$^{17(21)}$-ene ($C_{30:1}$)
9	(2410)	homohop-$\Delta^{17(21)}$-ene ($C_{31:1}$)

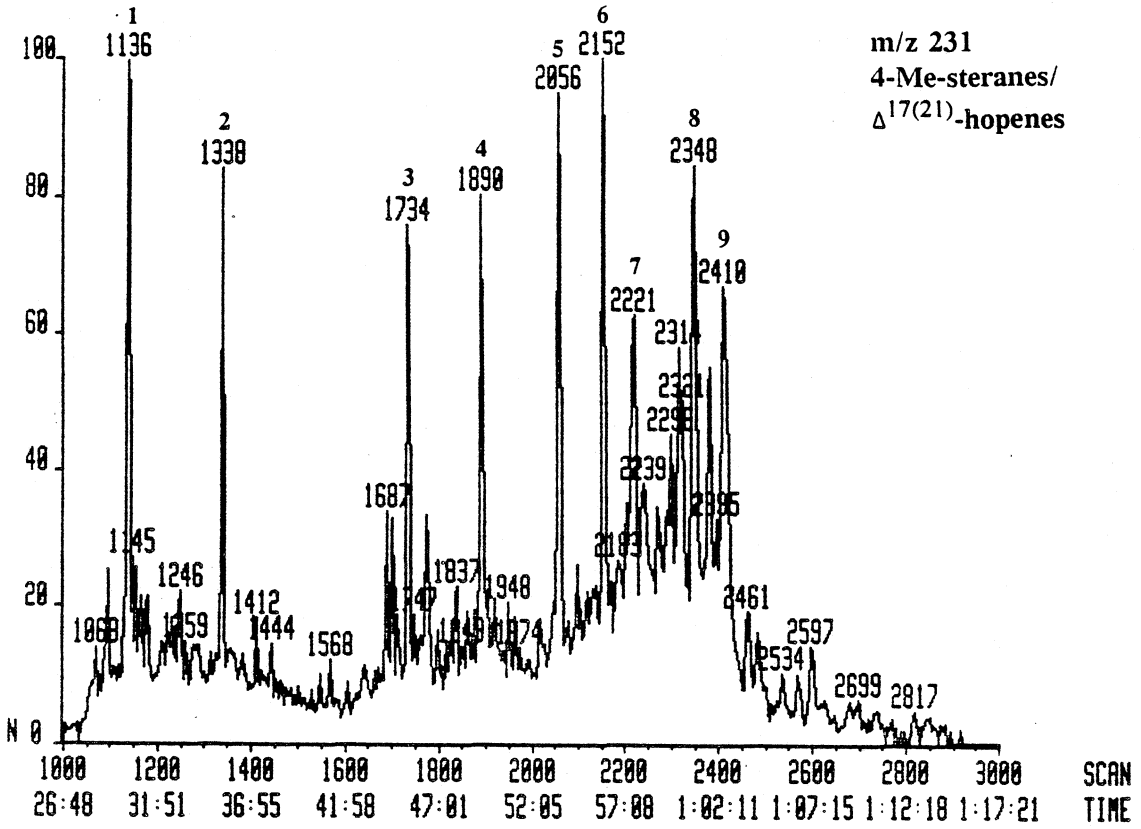


Figure II.5.7 4-Me-steranes and/or $\Delta^{17(21)}$-hopenes. M/z 231. Mass chromatograms from E-646 (47.56 m) in core 6307/07-U-02, Spekk Fm sub-unit 2.

M/z 271. Unknown sterenes/triterpanes.

A group of compounds with m/z 271 as one of the most abundant peaks was also encountered (Figure II.5.6). The fragment m/z 271 may come from loss of the side chain in rearranged sterenes with a nuclear methyl group. No reference spectra have been found in the literature, and this compound group has from mass spectra been tentatively identified as rearranged sterenes with a nuclear methyl group as seen in the peak identification list in Table II.5.8.

Table II.5.8 *Peak identification from m/z 271. Branched/cyclic fraction of sample E-646. Tentative identifications.*

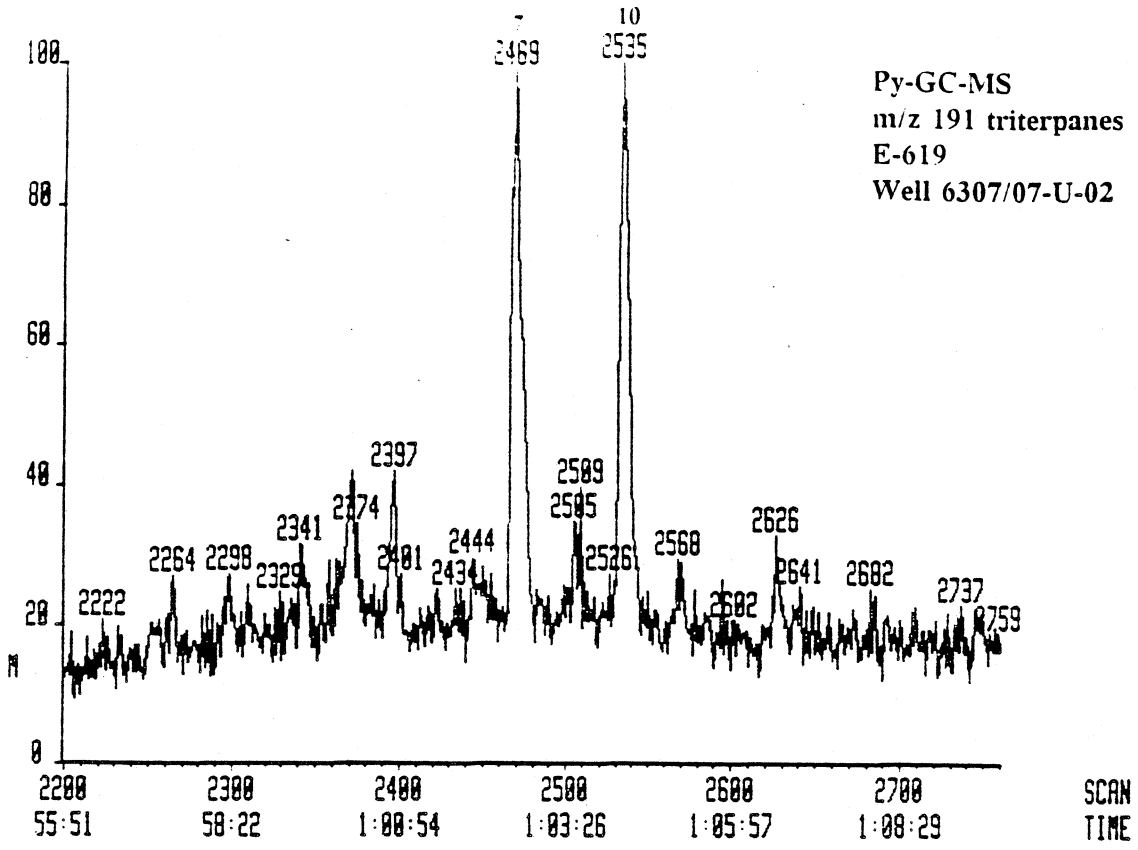
Peak no.	(scan)	Identification
1	(2050)	C_{28} rearranged sterene with nuclear methyl group
2	(2104)	" " " " " " "
3	(2110?)	C_{29} " " " " " "
4	(2157)	" " " " " " "
5	(2176)	C_{30} " " " " " "
6	(2231)	" " " " " " "
7	(2240)	" " " " " " "

II.5.2 Peak identification in pyrolysis-GC-MS chromatograms.

Identification was done by comparism of elution order and patterns in the chromatograms with samples previously analysed at IKU and data from the literature. Spectra of different peaks were also evaluated and compared with literature data. Samples on triterpane mass chromatograms (m/z 191) are shown in Figure II.5.8. The peak identifications in these mass chromatograms are listed in Table II.5.9

Table II.5.9 *Peak identification in triterpane mass chromatograms, m/z 191. PY-GC-MS.*

Peak no.	Compound	
2	18α(H)-trisnorneohopane (T_s)	$C_{27}H_{46}$
3a	trinor-hop-$\Delta^{17(21)}$-ene	$C_{27}H_{44}$
3	17α(H)-trisnorhopane (T_m)	$C_{27}H_{46}$
4	17β(H)-trisnorhopane	$C_{27}H_{46}$
5	norhop-$\Delta^{13(18)}$-ene?	$C_{29}H_{48}$
7a	unidentified	
7	norhopane (17β(H), 21α(H)?)	$C_{29}H_{50}$
9a	unidentified	
10	hopane (17β(H), 21α(H)?)	$C_{30}H_{52}$



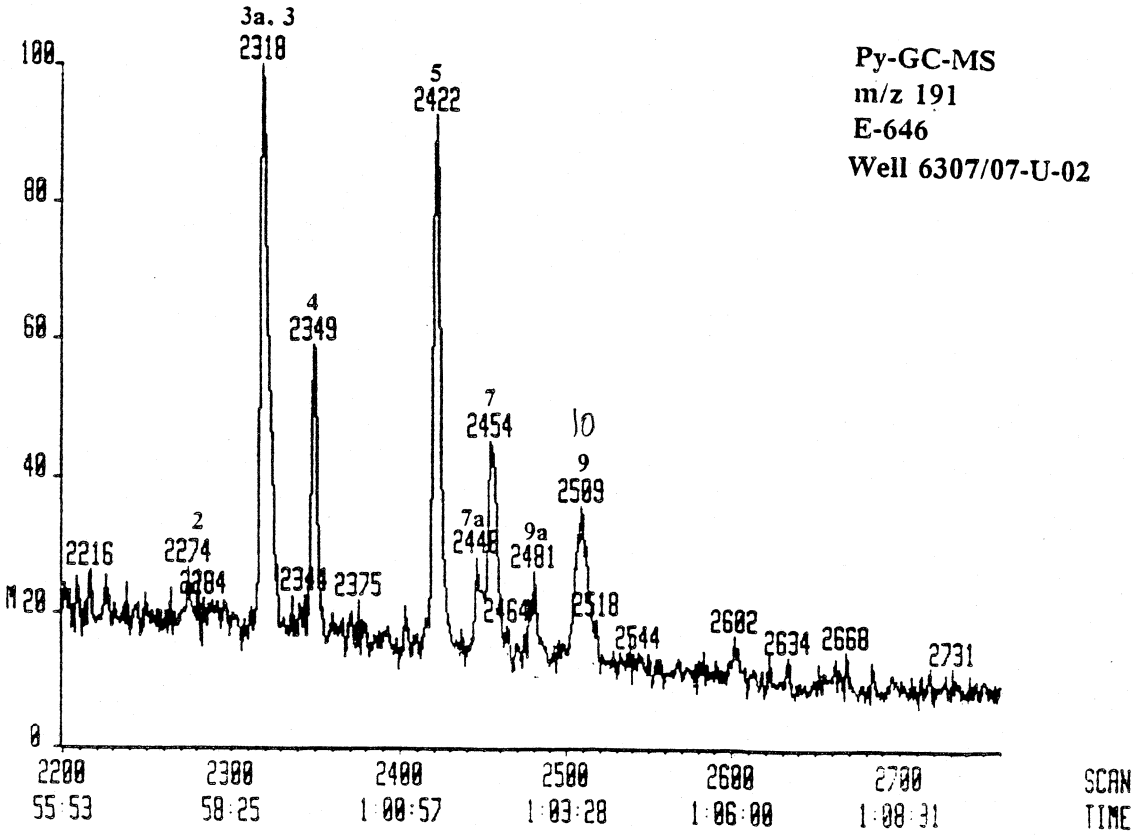


Figure II.5.8 Examples on PY-GC-MS triterpane distributions (m/z 191). E-619 and E-646 from Lange and Spekk Fm, respectively.

II.6 Description of pyrolysis-GC-MS results for the Spekk and Lange Formations in cores 6307/07-U-03A and 6307/07-U-02.

II.6.1 Core 6307/07-U-03A, Spekk Fm sub-unit 1

The total ion chromatograms (TIC) of the 6307/07-U-03A kerogen pyrolysates are all dominated by n-alkene/n-alkane homologues from C_8 to C_{30} (Figure II.6.1). The distribution of n-alkenes/n-alkanes is frontbiased in the two samples with highest hydrogen index (HI) (E-227 and E-230). The other samples have a more uniform distribution up to approximately nC_{17}, from where the intensities drops evenly. One sample (E-249), with the lowest hydrogen index (HI), shows low intensity of the n-alkene/n-alkanes in the low molecular end of the mass chromatograms. The reason for this is not known but unstable instrumental conditions cannot be ruled out.

The m/z 97 (alkenes/cycloalkanes) and m/z 99 (alkanes) mass chromatograms confirm the low relative content of branched and cyclic alkanes in the pyrolysates from core 6307/07-U-03A. The pyrolysis products 1-pristene and 2-pristene are, however, observed in varying concentrations in these samples. Figure II.6.2 shows that the concentration of (1+2) pristene relative to nC_{17} alkene+alkane decreases considerably with increasing depth.

The total ion chromatograms of most samples from Spekk Fm sub-unit 1 show a series of peaks eluting just before the n-alkenes, indicative of n-alkadienes in these samples, which is confirmed by the m/z 95 mass chromatograms (Figure II.6.1). The ratio of n-alkadienes to n-decene is given in Table II.6.1. The pyrolysates of samples E-239 and E-249 contain no detectable amounts of n-alkadienes, whereas the other five samples show the same concentration of this compound group.

The mass chromatograms that represent the monoaromatic hydrocarbons (m/z 91, 105 and 106) are dominated by the low-molecular weight components, mainly toluene (m/z 91), xylenes and C_3-benzenes. All pyrolysates from core 6307/07-U-03A show also homologous series of alkylbenzenes above C_4-benzenes (Figure II.6.3). These homologues consist mainly of three peaks eluting together, all of which represents alkylbenzene isomers with the same number of carbons. The three isomers could be o-, m- and p-isomers of long-chain alkylbenzenes (1- tolylalkanes?) as tentatively proposed by Solli et al. (1979) and Radke (1987). These series decrease in intensity up to approximately C_{23}-alkylbenzene where the series cease (m/z 105).

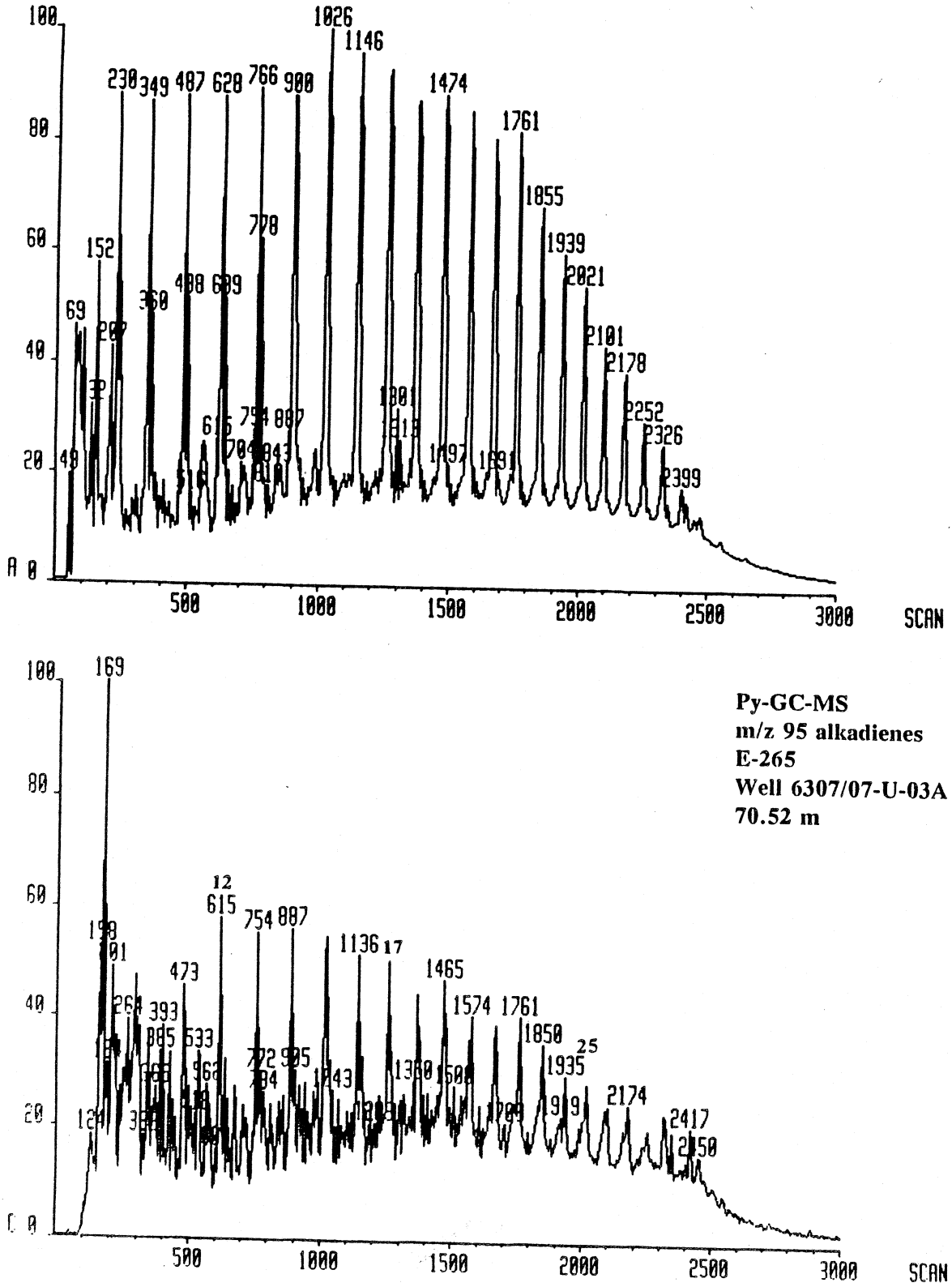


Figure II.6.1 *PY-GC-MS. Examples from Spekk Formation sub-unit 1 in core 6307/07-U-03A. Uppermost chromatogram: TIC. Lowermost chromatogram: Alkadienes m/z* 95

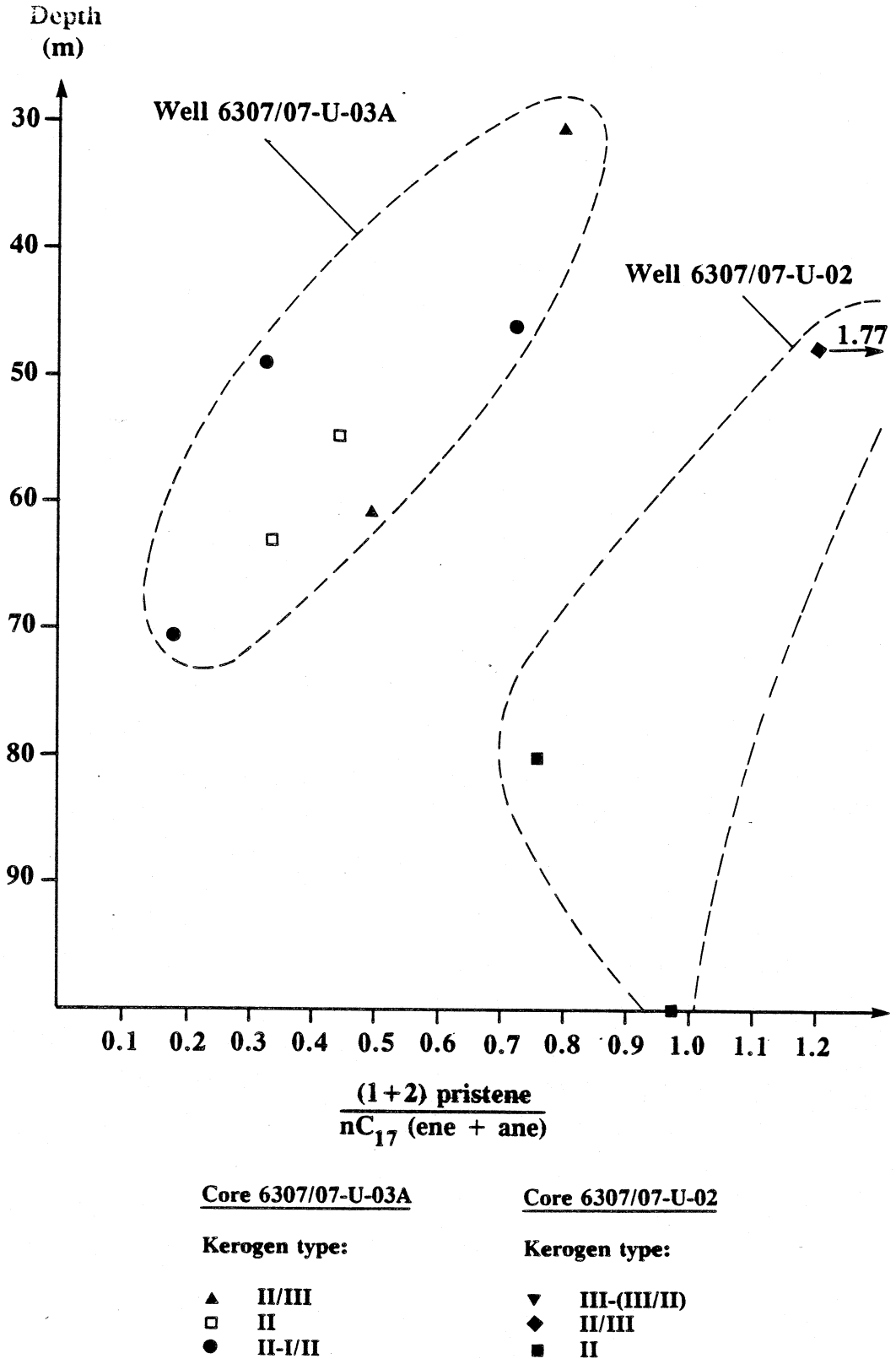


Figure II.6.2 Variations in relative pristene content with depth. (Based on peak heights).

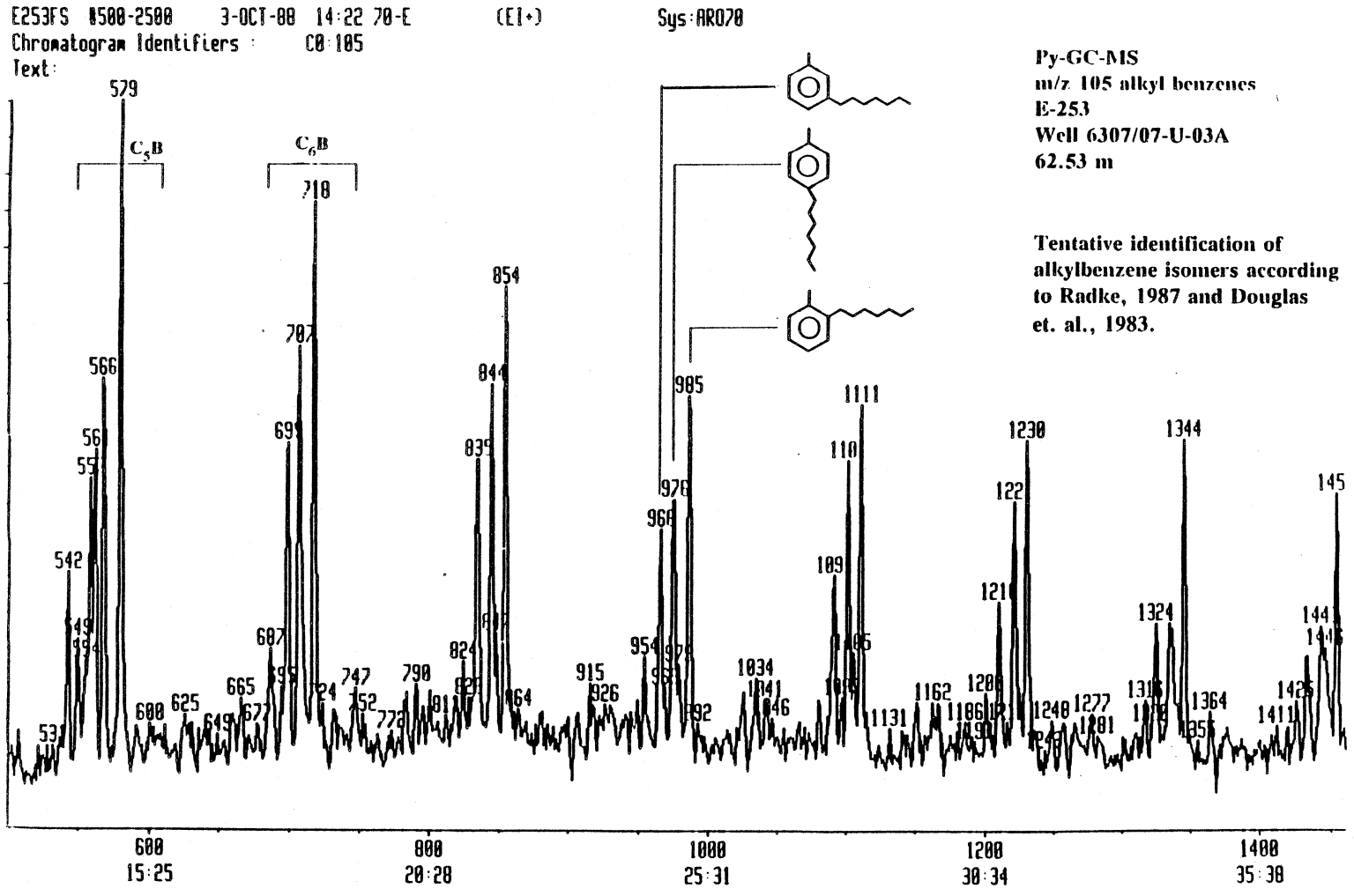


Figure II.6.3Homologous series of alkylbenzenes in core 6307/07-U-03A.

Table II.6.1 Molecular ratios from PY-GC-MS chromatograms of kerogens. Branched compounds and aromatics. All ratios are calculated from peak heights.

	Depth (m)	HI	$\frac{C_{11}-C_{17}\ alkene}{alkane}$ [1]	$\frac{1\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{(1+2)\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{alkadiene}{n\text{-decene}}$ [2]
Core 6307/07-U-03A						
E-193	30.86	300	1.41	0.48	0.79	0.13
E-227	46.20	558	1.18	0.52	0.72	0.16
E-230	48.77	639	1.25	0.23	0.32	0.17
E-239	55.20	404	1.47	0.15	0.44	~0
E-249	60.83	256	1.10	0.21	0.49	~0
E-253	62.83	452	1.35	0.13	0.23	0.24
E-265	70.52	495	1.59	0.10	0.18	0.24

1) Measured from the total ion chromatograms (TICs)

2) Alkadienes from m/z 95, n-decene from m/z 97. $nC_{12}+nC_{15}+nC_{17}$ alkadienes are used here.

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The m/z 141 mass chromatograms represents both methylnaphthalenes (MN), dimetnylnaphthalenes (DMN) and n-alkanes even though their relative response is not the same. To get an impression of relative content of naphthalenic compounds in the different samples, the ratio of MN/n-heptadecane (both from m/z 141) was calculated (Table II.6.2). A plot of this ratio versus hydrogen index (HI) is shown in Figure (II.6.4). It can be seen from this figure that the relative methylnaphthalene content tends to decrease with increasing hydrogen index (HI). Sample E-249 is the only exception from this trend, as it shows a relatively low MN content together with a low HI.

Triaromatic hydrocarbons are represented by methylphenanthrenes (MP). In Figure II.6.5 the total amount of methylphenanthrenes relative to n-decene is plotted versus hydrogen index (HI). This plot shows that the relative amount of MP in the pyrolysates decrease with increasing hydrogen index.

Phenol and methylphenols are identified from the m/z 94 and m/z 108 mass chromatograms, respectively. The relative phenol and xylene content of the pyrolysates can be used for classification of kerogens, according to Larter (1983). In Figure II.6.6 the (m+p)xylene/n-decene is plotted against the phenol/n-decene ratio. This plot indicates that the content of xylene and phenol is clearly higher in the type II/III kerogens compared to that of the II-I/II kerogens. Sample (E-239) shows somewhat raised relative xylene and phenol concentrations in view of its kerogen type.

Sulphur aromatics, represented by methyldibenzothiophenes (MDBT) and their alkyl homologues (from m/z 184, 198, 212), are of low intensity in all pyrolysates from core 6307/07-U-03A. In the biplot of MDBT/n-tetradecene versus (m+p)xylene/n-decene (Figure II.6.7) these pyrolysates group together in the lower MDBT and xylene part of the diagram. The type II/III kerogen pyrolysate of sample E-193 contains somewhat higher relative concentrations of xylenes and MDBT.

Table II.6.2 PY-GC-MS. Relative concentration of aromatics in pyrolysate.

	Depth (m)	HI	(m+p)-xylene [1] / n-decene	o-xylene [1] / n-decene	$\Sigma_{i=15}^{20} C_i B$ [2] / $C_{15}B$	(1+2) MN [3] / n-heptadecane	MP [4] / n-decene	MDBT [5] / n-tetradecane
Core 6307/07-U-03A								
E-193	30.86	300	3.5	3.0	0.56	12.3	0.24	0.35
E-227	46.20	558	1.6	0.8	0.57	3.0	0.04	0.00
E-230	48.77	639	1.4	0.8	1.29	3.5	0.07	0.15
E-239	55.20	404	2.0	2.4	0.67	8.8	0.24	0.28
E-249	60.83	256	2.2	1.0	1.34	4.3	0.35	0.15
E-253	62.83	452	1.7	1.0	0.95	5.9	0.20	0.24
E-265	70.52	495	1.7	1.2	0.98	4.1	0.10	0.13

1) Xylenes from m/z 106, n-decene from m/z 97.

2) Alkylbenzenes from m/z 105. The most intense isomers is used for each C-number.

3) Methylnaphthalenes (MN) and n-heptadecane from m/z 141.

4) Methylphenanthrenes from m/z 192, n-decene from m/z 97. The sum of 3-MP, 2-MP, 9-MP and 1-MP is used.

5) Methyldibenzothiophenes (MDBT) from m/z 198, n-decene from m/z 97.

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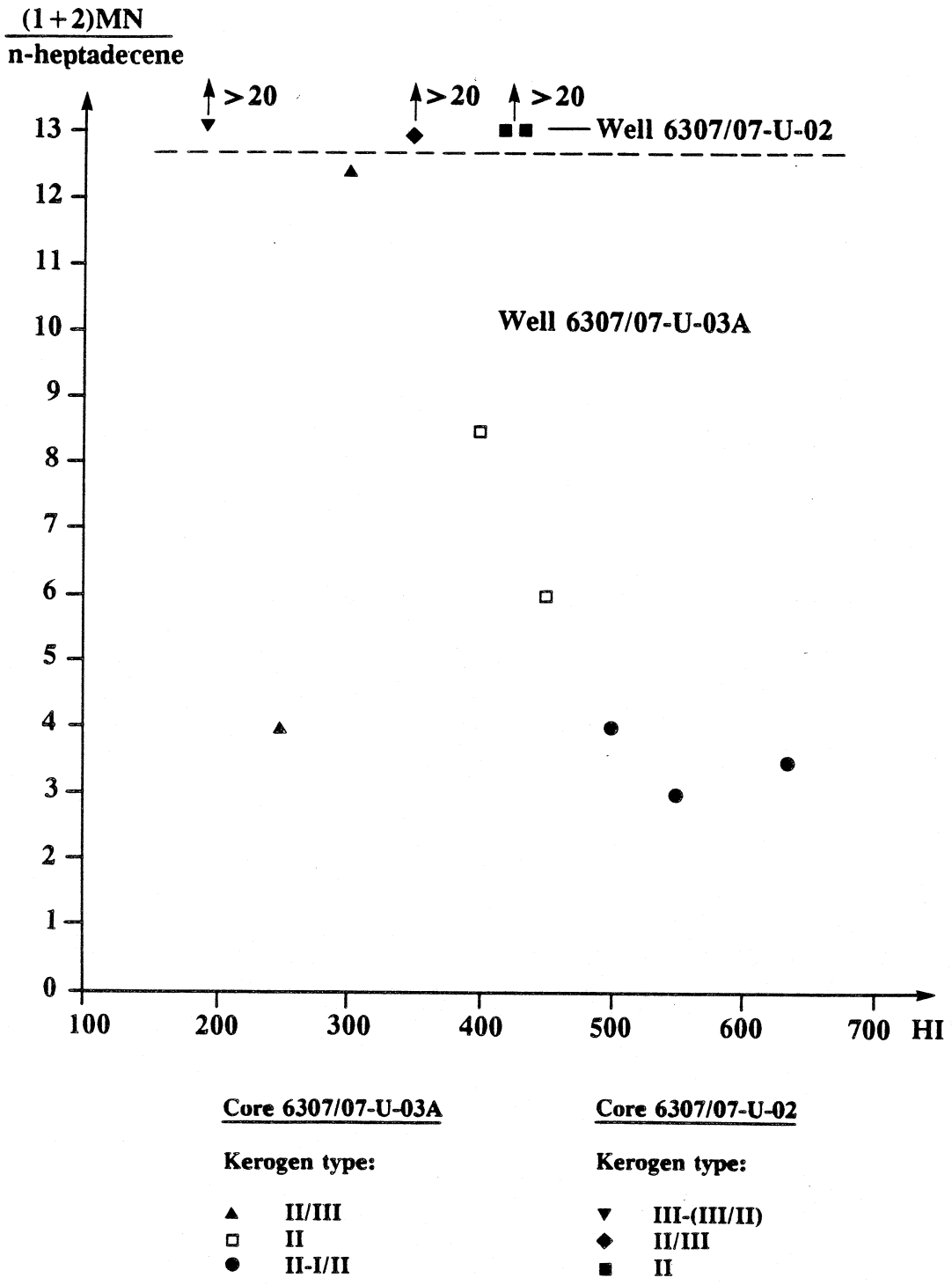


Figure II.6.4 Relative content of methylnaphthalenes versus Rock-Eval hydrogen index (HI in mg HC/g TOC). Based on peak weights.

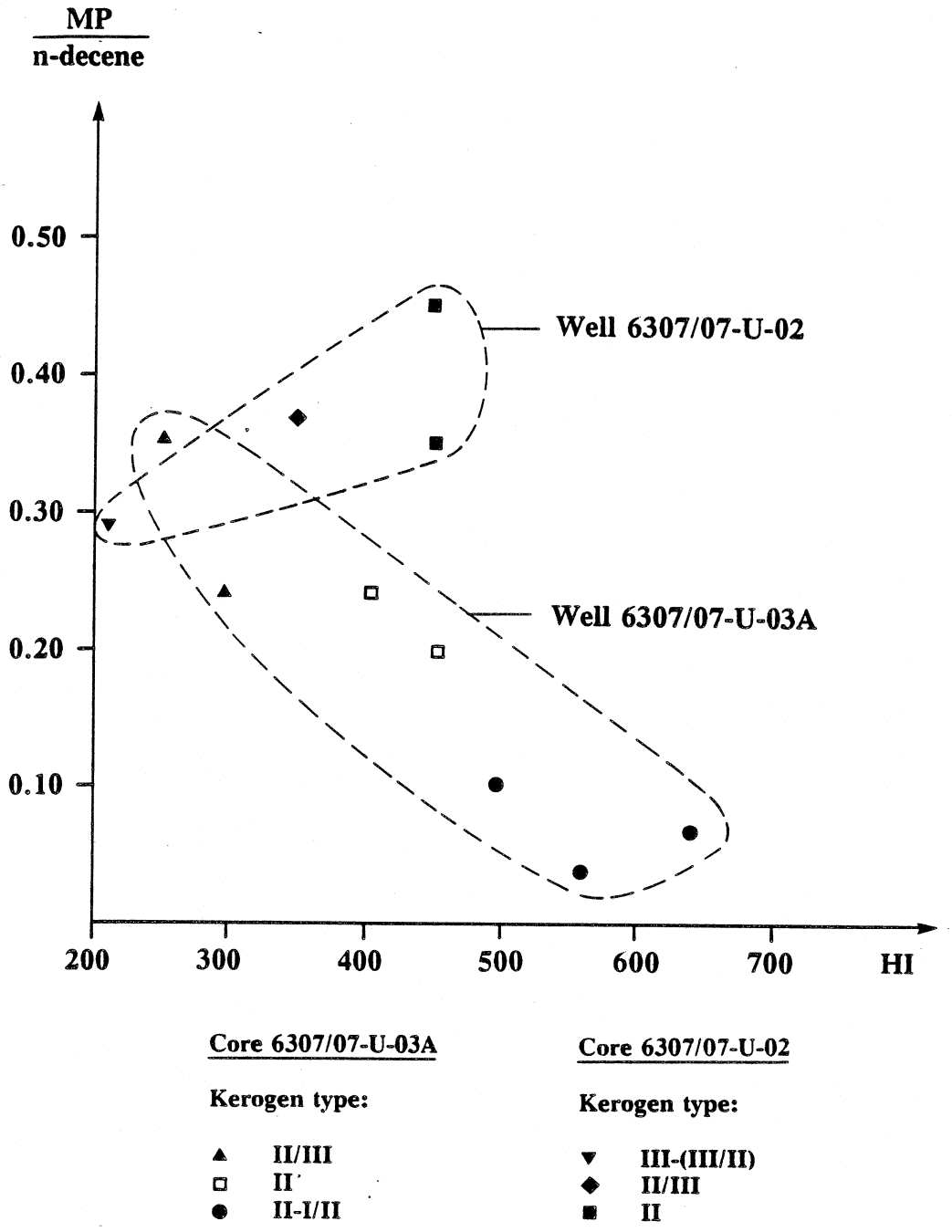
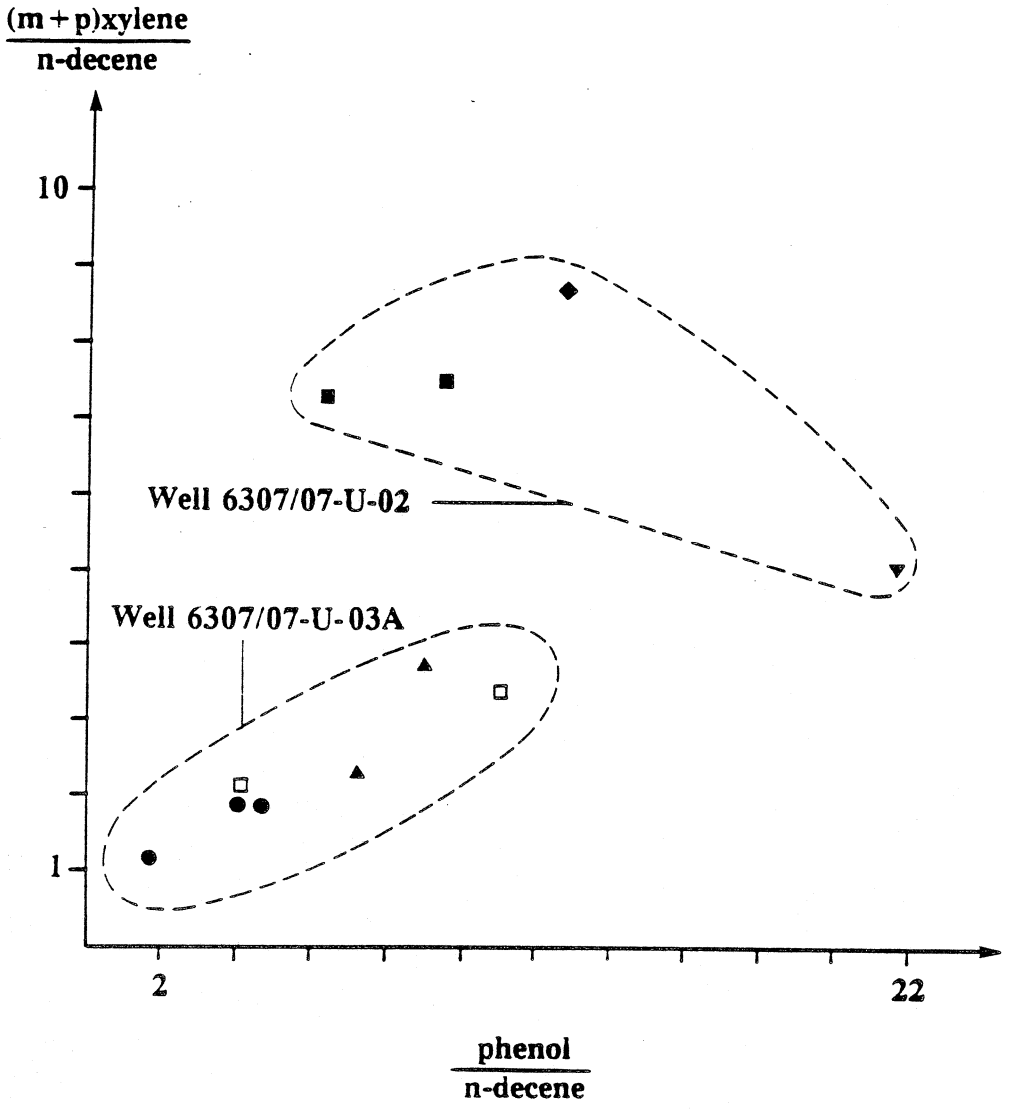


Figure II.6.5 *Relative content of methylphenanthrenes versus Rock-Eval hydrogen indec (HI) in mg HC/g TOC). Based on peak heights.*



Core 6307/07-U-03A

Kerogen type:

- ▲ II/III
- □ II
- ● II-I/II

Core 6307/07-U-02

Kerogen type:

- ▼ III-(III/II)
- ◆ II/III
- ■ II

Figure II.6.6 *Crossplot of PY-GC-MS (m+p)-xylene/n-decene (based on peak areas) against phenol/n-decene. Cores 6307/07-U-03A and 6307/07-U-02.*

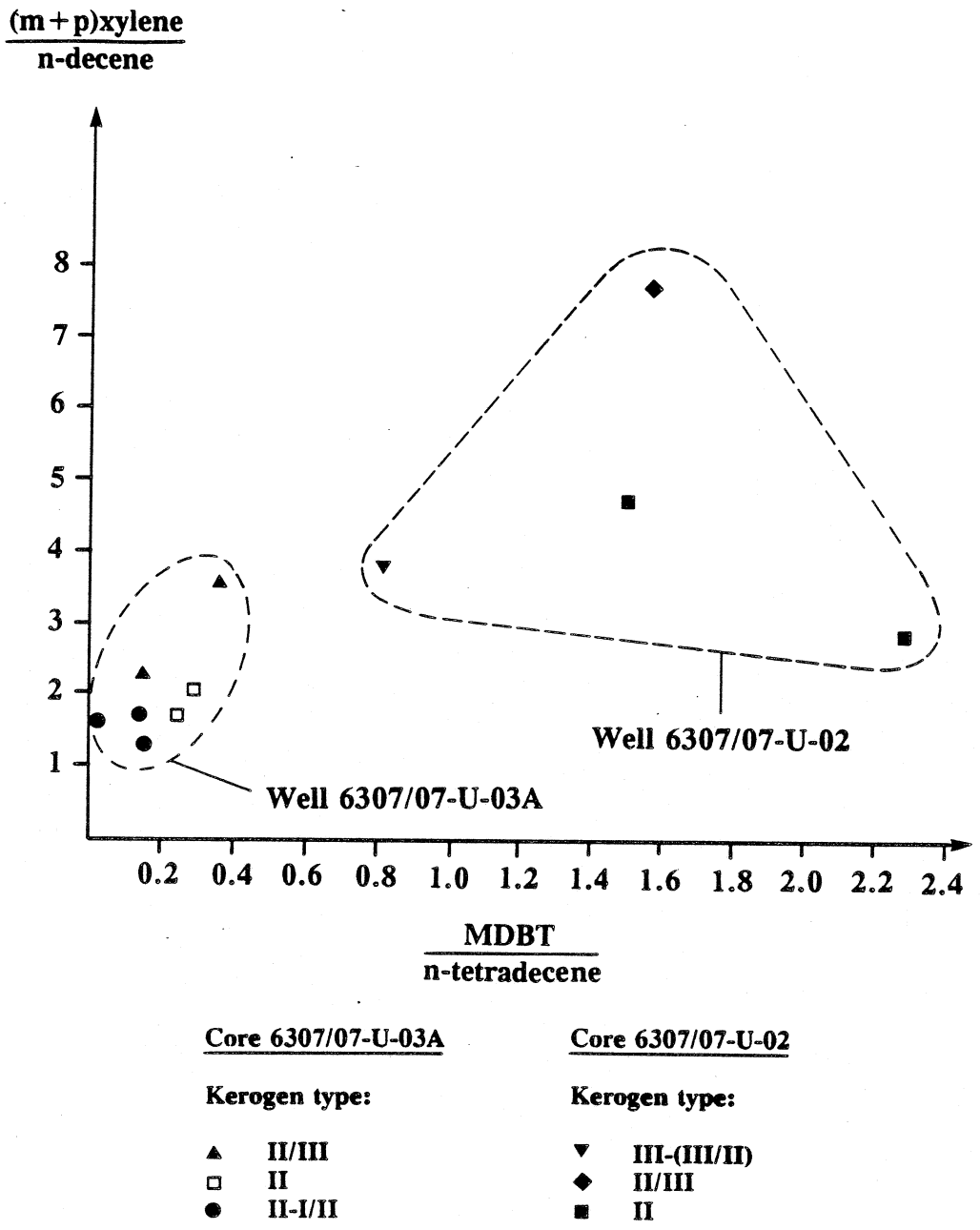


Figure II.6.7 *Crossplot of PY-GC-MS (m+p)-xylene/n-decene (based on peak areas) against phenol/n-decene. Cores 6307/07-U-03A and 6307/07-U-02.*

II.6.2 Core 6307/07-U-02, Spekk and Lange Formations. A comparison with PY-GC-MS results from core 6307/07-U-03A

Spekk Formation sub-unit 2

Three samples from the Spekk Fm sub-unit 2 were analysed by Py-GC-MS. The pyrolysates of the samples are broadly similar. The TIC's of the samples of the Spekk Formation sub-unit 2 are dominated by n-alkene/n-alkane homologues that decrease in intensity with increasing molecular weight. Sample E-718 (80.07 m) shows a n-alkene/n-alkane maximum at C_{15} and a large unresolved "hump" in the high molecular end of the TIC.
The m/z 97 and 99 mass chromatograms indicate that the concentrations of branched and cyclic alkanes relative to the alkenes and alkanes are higher in the Spekk Formation sub-unit 2 of core 6307/07-U-02 than in the Spekk Formation sub-unit 1 of core 6307/07-U-03A. This is also reflected in the higher (1+2)-pristene/nC_{17}-(alkene+alkane) ratios (Table II.6.3, Figure II.6.2).

A negligible concentration of n-alkadienes can be detected in the pyrolysates from core 6307/07-U-02.

The alkylbenzenes (m/z 91, 105 and 106) show the same distribution pattern as seen in core 6307/07-U-03A. The relative intensities of the homologues above C_5-alkylbenzene is, however, slightly lower for the three samples from core 6307/07-U-02. The concentration of monoaromatic compounds relative to alkenes/alkanes tends to be higher in the pyrolysates from this core compared to that of core 6307/07-U-03A. This can also be seen from the (m+p)xylene/n-decene and o-xylene/n-decene ratios given in Table II.6.4. The relative xylene content (Figure II.6.6) is slightly higher in the type II/III kerogen (E-646) than in the type II kerogens (E-718 and E-765).

In contrast to the 6307/07-U-03A samples, the m/z 141 mass chromatograms of the 6307/07-U-02 pyrolysates show very high methylnaphthalene relative to n-heptadecane signals.

In Figure II.6.5 the relative methylphenanthrene content is plotted against hydrogen index (HI). An increase in the MP/n-decene ratio with increasing hydrogen index is observed for these four samples from core 6307/07-U-02 including the sample from the Lange Formation. This contrasts strongly the results from core 6307/07-U-03A.

The relative content of phenol and methyl-phenols (vs. n-decene) is shown

Table II.6.3 Molecular ratios from PY-GC-MS chromatograms of kerogens. Branched compounds and aromatics. All ratios are calculated from peak heights.

	Depth (m)	HI	$\frac{C_{11}-C_{17}\ alkene}{alkane}$ [1]	$\frac{1\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{(1+2)\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{alkadiene}{n\text{-decene}}$ [2]
Core 6307/07-U-02						
E-619	34.83	212	-	-	-	~0
E-646	47.56	350	1.40	1.31	1.77	~0
E-718	80.07	456	1.25	0.66	0.75	~0
E-765	101.42	450	1.15	0.85	0.95	~0

1) Measured from the total ion chromatograms (TICs)

2) Alkadienes from m/z 95, n-decene from m/z 97. $nC_{12}+nC_{15}+nC_{17}$ alkadienes are used here.

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Table II.6.4

IKU no.	Depth (m)	HI	(m+p)-xylene / n-decene	o-xylene / n-decene	phenol / n-decene	meth.phenol / n-decene	2-meth.phenol / 1-meth.phenol
Core 6307/07-U-03A							
E-193	30.86	300	3.7	2.7	9.1	10.0	0.43
E-227	46.20	558	1.9	1.0	4.1	3.6	0.43
E-230	48.77	639	1.2	0.8	1.8	2.5	0.51
E-239	55.20	404	3.4	2.5	11.1	9.6	0.51
E-249	60.83	256	2.3	1.1	7.2	7.9	0.47
E-253	62.83	452	2.1	1.3	4.1	5.6	0.48
E-265	70.52	495	1.9	1.3	4.7	4.8	0.47

Xylenes from m/z 106, n-decene from m/z 97, phenol from m/z 94, methylphenols from m/z 108.

in Table II.6.4 and plotted against (m+p)xylene/n-decene in Figure II.6.6. The relative phenol content decreases in the order type III-(III/II) kerogen > type II/III kerogen > type II kerogen, whereas the variations in xylenes are less pronounced.

The methyldibenzothiophenes (from m/z 198) show appreciably higher intensities relative to n-tetradecene (also from m/z 198) in the core 6307/07-U-02 compared to core 6307/07-U-03A. This is seen from Table II.6.4 and Figure II.6.7.

II.6.3 Lange Formation sub-unit 1 in core 6307/07-U-02. Sample E-619 (34.83 m).

Sample E-619 from 34.83 m in core 6307/07-U-02 is very different from all the other samples analysed with respect to total ion chromatograms (TIC) (Figure II.6.8).

Some homologous series are seen, but the major peaks are spread over the whole temperature range and do not occur in any systematic pattern.

The peaks have been tentatively identified from their mass spectra, and these identifications are presented in Table II.6.5. Some of the peak groups are discussed below.

Alkenes from C_{11} and at least up to C_{18} are observed, but little input of alkanes is detected. A series of long chain alkylbenzens is among the major compounds. Some compunds that probably contain oxygen functions are seen. These compounds have not been identified in detail. In addition, two groups of uncommon compounds are tentatively identified as long chain thiols or thioethers and long chain nitriles. The mass chromatograms m/z 152 and m/z 168 show the distribution of the nitriles and thiols/thioethers, respectively.

The triterpane distribution in the m/z 191 mass chromatograms of E-619 is also different compared to the other pyrolysates. The two main compounds in the m/z 191 mass chromatogram are identified as C_{29} and C_{30} hopane.

Table II.6.5 Identification of peaks in sample E-619 (Figure II.6.8). Peak identification from mass spectra.

Specter no.	Identification
163	Cyclohexane/cyclopentane derivative
170	
379	C_2-benzene + unidentified compound
431	unidentified compound
518	C_{11}-alkenes
527	
538	
550	
661	C_{12}-alkenes
681	
801	C_{13}-alkenes
819	
832	
913	unidentified
928	unidentified
934	C_{14}-alkene + unidentified
1033	$C_{19}H_{19}$-benzene
1061	C_{15}-alkene
1158	$C_{10}H_{21}$-benzene
1182	C_{16}-alkene
1277	$C_{11}H_{23}$-benzene
1301	C_nH_{2n+1}-CN (n=15?)
1351	long chain thiol or thioether
1407	C_{18}-alkene
1460	unidentified
1519	C_nH_{2nH}-CN (n=17?)
1594	long chain (branched) acid/alcohol/ether
1720	C_nH_{2nH}-CN (n=19?)
1801	alkene
1819	retene (m/z 234 ion chromatogram)
1979	unidentified
2143	alkene
2297	unidentified
2359	cholestadiene (?) + unidentified

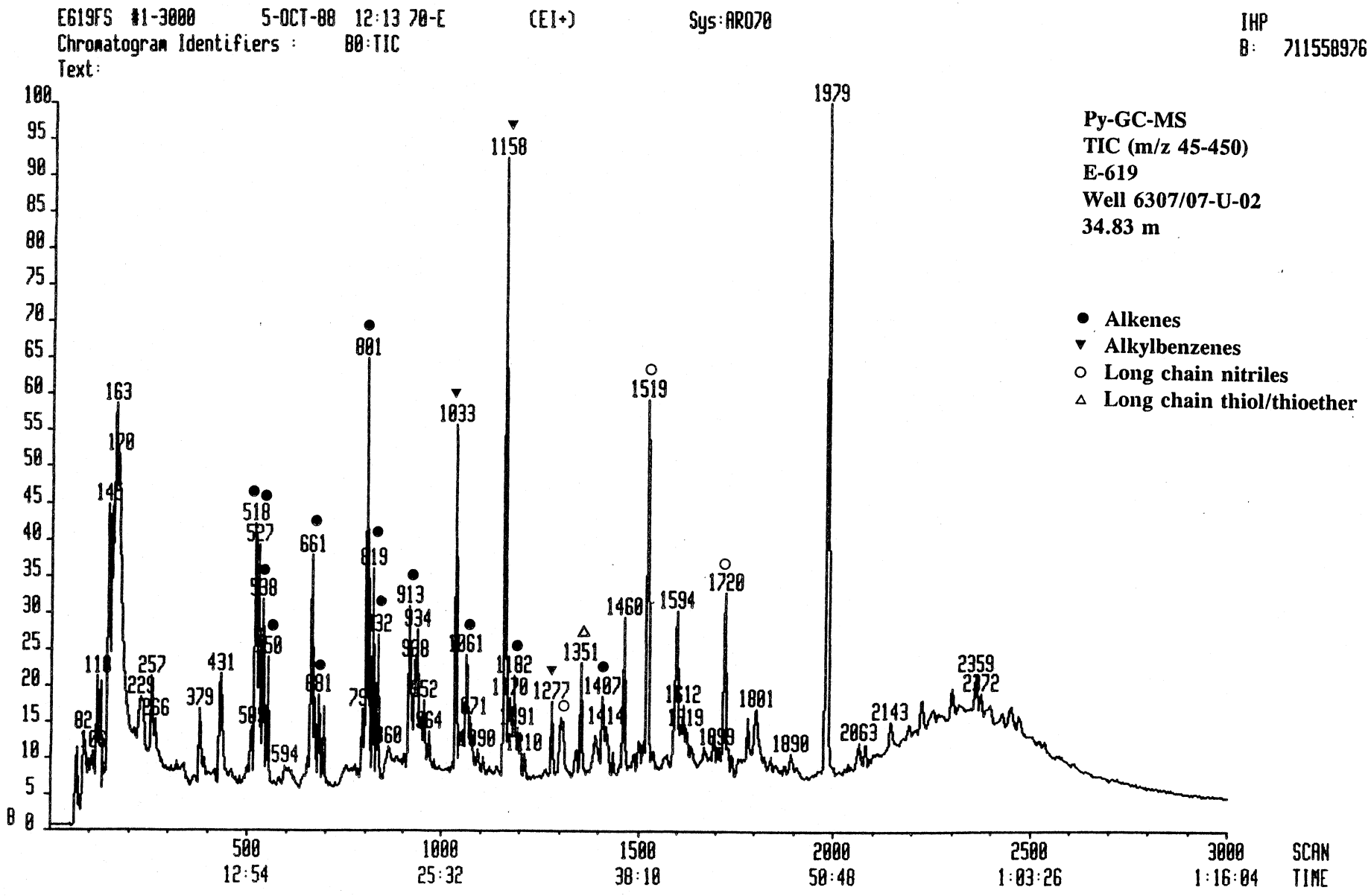


Figure II.6.8 PY-GC-MS TIC of sample E-619 from the Lange Formation sub-unit 1.

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SECTION III

ANALYTICAL RESULTS

IKU SINTEF-GRUPPEN

III.1 CORE 6206/02-U-03

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III.1.2 Data from Rock-Eval pyrolysis and determination of TOC

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IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6206/02-U-03
Date : 88.07.12

Table III.1.1 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0555	BULK	161.7	CORE	0.14

Table III.1.2

DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0555	BULK	161.70	CORE	0.00	0.00	0.03	0.14	0	21	0.00	0.00	323**

** Tmax not reliable due to ill-defined or very low S2-peak.

III.2 CORE 6206/02-U-02

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III.2.1 Huminite reflectance histogram

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IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6206/02-U-02
Date : 88.10.12

Table III.2.1a TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0003	74.31	14318	0	0	0	0	0	14318	0	0.0	
E0017	84.68	14576	0	0	0	0	0	14576	0	0.0	
E0039	113.89	7287	0	0	0	0	0	7287	0	0.0	
E0044	122.39	27548	33	0	0	0	0	27581	33	0.1	

Table III.2.1b TABLE OF GAS RESULTS

Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0003	74.31	440	9	0	0	0	0	449	9	2.0	
E0017	84.68	1245	21	0	0	0	0	1266	21	1.7	
E0039	113.89	2823	10	0	0	0	0	2833	10	0.4	
E0044	122.39	522	23	6	0	0	0	551	29	5.3	

Table III.2.1c TABLE OF GAS RESULTS

Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0003	74.31	14758	9	0	0	0	0	14767	9	0.1	
E0017	84.68	15821	21	0	0	0	0	15842	21	0.1	
E0039	113.89	10110	10	0	0	0	0	10120	10	0.1	
E0044	122.39	28070	56	6	0	0	0	28132	62	0.2	

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6206/02-U-02
Date : 88.07.12

Table III.2.2 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0007	BULK	74.5	CORE	0.98
E0011	BULK	77.1	CORE	0.28
E0020	BULK	85.3	CORE	1.14

Table III.2.3 DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0007	BULK	74.50	CORE	0.02	0.05	0.27	0.98	5	27	0.07	0.28	276**
E0011	BULK	77.19	CORE	0.01	0.00	0.12	0.28	0	42	0.01	1.00	236**
E0020	BULK	85.35	CORE	0.02	0.04	0.39	1.14	3	34	0.06	0.33	324**

** Tmax not reliable due to ill-defined or very low S2-peak.
Production index not reliable due to negligible values of S1 and S2.

Table III.2.4 HUMINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	REL RAT	STANDARD DEVIATION	FLUORESCENCE
E-019	------	85.07	0.36 (16)	F	0.07	3,6-7
			0.56 (1)	R	0.00	

REL RAT (Reliability Rating): G = Good; F = Fair; P = Poor;
LRV = Low Reflecting Vitrinite; HRV = High Reflecting Vitrinite; LRM = Low Reflecting Material; I = Inertinite.

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FIGURES

IKU SINTEF-GRUPPEN

Figure III.2.1

Huminite reflectance histograms

Key:

A = Grey-black-brown claystone.
Upper case letters indicate values included in the main population. Lower case letters represent values in other populations.

PP = Statistical data populations
Y = Main population, not necessarily representative of sample maturity,
N = Other populations.

LOW+HIGH = Population limits

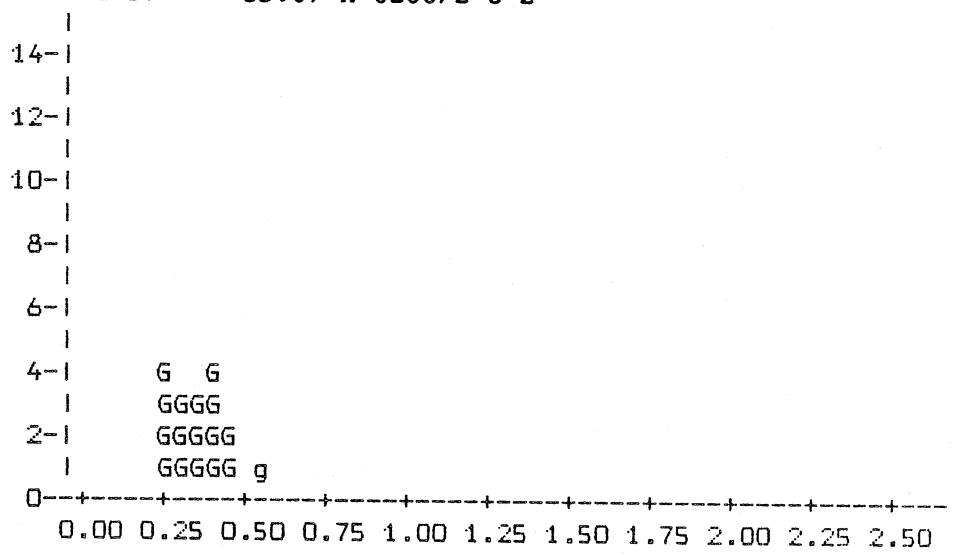
VAL. = Number of measurements in that population

Lithology cross-reference table

A = Clst. gy
B = Clst. dk gy
C = Clst. gn
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbargillite
N = Siltstone
O = Bit
P = X

IKU SINTEF-GRUPPEN

IKU# E-19 85.07 M 6206/2-U-2



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.26	0.48	ALL	16	0.36	0.07
N	0.56	0.57	ALL	1	0.56	0.00
			OVERALL	17	0.37	0.08

ORDERED VALUES FOLLOW:

0.26G 0.27G 0.27G 0.29G 0.32G 0.32G 0.34G 0.36G 0.38G 0.38G 0.40G
0.40G 0.43G 0.44G 0.45G 0.47G 0.56g

IKU SINTEF-GRUPPEN

III.3 CORE 6206/02-U-08

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III.3.4 Huminite reflectance data

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IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6206/02-U-08
Date : 88.10.12

Table III.3.1a TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0508	74.66	11730	0	0	0	0	0	11730	0	0.0	

Table III.3.1b TABLE OF GAS RESULTS

Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0508	74.66	373	17	6	0	0	0	396	23	5.8	

Table III.3.1c TABLE OF GAS RESULTS

Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0508	74.66	12103	17	6	0	0	0	12126	23	0.2	

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6206/02-U-08
Date : 88.07.12

Table III.3.2 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0504	BULK	65.7	CORE	0.22
E0505	BULK	67.3	CORE	0.21
E0506	BULK	72.1	CORE	0.40
E0510	BULK	77.5	CORE	0.22
E0512	BULK	79.8	CORE	0.25
E0517	BULK	101.2	CORE	0.55
E0518	BULK	103.1	CORE	0.21

Table III.3.3 DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0504	BULK	65.70	CORE	0.02	0.00	0.25	0.22	0	113	0.02	1.00	276**
E0505	BULK	67.30	CORE	0.02	0.00	0.27	0.21	0	128	0.02	1.00	341**
E0506	BULK	72.15	CORE	0.01	0.03	0.18	0.40	7	45	0.04	0.25	278**
E0510	BULK	77.50	CORE	0.01	0.00	0.16	0.22	0	72	0.01	1.00	223**
E0512	BULK	79.85	CORE	0.01	0.00	0.25	0.25	0	100	0.01	1.00	222**
E0517	BULK	101.29	CORE	0.01	0.02	0.15	0.55	3	27	0.03	0.33	282**
E0518	BULK	103.14	CORE	0.02	0.00	0.12	0.21	0	57	0.02	1.00	240**

** Tmax not reliable due to ill-defined or very low S2-peak.
Production index not reliable due to negligible values of S1 and S2.

Table III.3.4 HUMINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	REL RAT	STANDARD DEVIATION	FLUORESCENCE
E-519	------	106.48	N.D.P.	-	----	1

REL RAT (Reliability Rating): G = Good; F = Fair; P = Poor;
LRV = Low Reflecting Vitrinite; HRV = High Reflecting Vitrinite; LRM = Low Reflecting Material; I = Inertinite.

IKU SINTEF-GRUPPEN

III.4 CORE 6206/02-U-01

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TABLES

Core 6206/02-U-01

Table III.4.1 Analytical programme, follow-up analyses Argillaceous rocks

IKU no.	Depth (m)	HI	TOC	1 VI	2 TAI/ SCI	3 Extr.	4 MPLC	5 CGC-SAT	6 CGC-ARO	7 Urea add.	8 CGC/ cycl	9 CGC n-alk	10 GC-MS Br./cycl	11 PY-GC-MS (ker)	12 $\delta^{13}C$ (ker)	13 δD (ker)
E-306	58.70			X												
E-366	89.62			X												
E-377	93.27			X												
E-385	98.35			X												
E-392	103.28			X												
E-397	106.96			X												
E-409	114.46	244	1.07			X	X			X			X			
E-411	116.05			X												
E-437	121.78			X												
E-449	131.87			X												
E-454	139.01			X												
E-464	145.15			X												
E-488	174.37			X												
E-494	180.98			X												
Total number of samples				13		1	1			1			1			

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Table III.4.2a TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0301	54.98	0	0	0	0	0	0	0	0		
E0308	58.00	0	0	0	0	0	0	0	0		
E0334	71.10	33514	9	0	0	0	0	33523	9	0.0	
E0400	108.56	6652	0	0	0	0	0	6652	0	0.0	
E0401	109.40	5111	0	0	0	0	0	5111	0	0.0	
E0407	113.28	8920	0	0	0	0	0	8920	0	0.0	
E0442	126.94	16699	0	0	0	0	0	16699	0	0.0	
E0450	132.65	5100	0	0	0	0	0	5100	0	0.0	
E0455	139.33	2960	0	0	0	0	0	2960	0	0.0	
E0462	145.43	10828	0	0	0	0	0	10828	0	0.0	
E0421	156.15	15363	0	0	0	0	0	15363	0	0.0	
E0425	159.89	8284	0	0	0	0	0	8284	0	0.0	
E0426	161.41	7288	0	0	0	0	0	7288	0	0.0	
E0428	164.11	11184	0	0	0	0	0	11184	0	0.0	
E0433	168.99	8486	0	0	0	0	6	8486	0	0.0	
E0434	170.71	8512	20	0	0	0	0	8532	20	0.2	
E0480	177.12	3753	0	0	0	0	0	3753	0	0.0	

Table III.4.2b Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0301	54.98	102	8	0	0	0	0	110	8	7.3	
E0308	58.00	140	13	0	0	0	0	153	13	8.5	
E0334	71.10	1631	10	0	0	0	0	1641	10	0.6	
E0400	108.56	2699	58	26	0	0	45	2783	84	3.0	
E0401	109.40	356	42	14	0	0	0	412	56	13.6	
E0407	113.28	678	89	28	0	0	55	795	117	14.7	
E0442	126.94	491	58	13	0	0	47	562	71	12.6	
E0450	132.65	245	12	0	0	0	0	257	12	4.7	
E0455	139.33	654	89	39	0	0	145	782	128	16.4	
E0462	145.43	482	27	14	0	0	0	523	41	7.8	
E0421	156.15	1079	42	14	0	0	0	1135	56	4.9	
E0425	159.89	17029	0	0	0	0	0	17029	0	0.0	
E0426	161.41	548	43	14	0	0	47	605	57	9.4	
E0428	164.11	563	47	29	0	0	0	639	76	11.9	
E0433	168.99	918	30	12	0	0	0	960	42	4.4	
E0434	170.71	713	65	13	0	0	57	791	78	9.9	
E0480	177.12	613	113	34	0	0	29	760	147	19.3	

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TABLE OF GAS RESULTS

Table III.4.2c Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0301	54.98	102	8	0	0	0	0	110	8	7.3	
E0308	58.00	140	13	0	0	0	0	153	13	8.5	
E0334	71.10	35145	19	0	0	0	0	35164	19	0.1	
E0400	108.56	9351	58	26	0	0	45	9435	84	0.9	
E0401	109.40	5467	42	14	0	0	0	5523	56	1.0	
E0407	113.28	9598	89	28	0	0	55	9715	117	1.2	
E0442	126.94	17190	58	13	0	0	47	17261	71	0.4	
E0450	132.65	5345	12	0	0	0	0	5357	12	0.2	
E0455	139.33	3614	89	39	0	0	145	3742	128	3.4	
E0462	145.43	11310	27	14	0	0	0	11351	41	0.4	
E0421	156.15	16442	42	14	0	0	0	16498	56	0.3	
E0425	159.89	25313	0	0	0	0	0	25313	0	-1.0	
E0426	161.41	7836	43	14	0	0	47	7893	57	0.7	
E0428	164.11	11747	47	29	0	0	0	11823	76	0.6	
E0433	168.99	9404	30	12	0	0	6	9446	42	0.4	
E0434	170.71	9225	85	13	0	0	57	9323	98	1.1	
E0480	177.12	4366	113	34	0	0	29	4513	147	3.3	

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IKU SINTEF-GRUPPEN

Table III.4.3 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0303	BULK	55.91	CORE	1.13
E0304	BULK	56.90	CORE	1.14
E0305	BULK	57.94	CORE	1.03
E0311	BULK	58.63	CORE	1.64
E0307	BULK	59.05	CORE	1.30
E0312	BULK	59.48	CORE	0.99
E0315	BULK	60.86	CORE	1.59
E0317	BULK	63.64	CORE	1.24
E0322	BULK	64.64	CORE	1.39
E0324	BULK	65.64	CORE	1.65
E0325	BULK	66.63	CORE	1.67
E0326	BULK	67.63	CORE	1.40
E0329	BULK	68.63	CORE	1.76
E0330	BULK	69.75	CORE	2.17
E0333	BULK	70.75	CORE	1.73
E0335	BULK	71.75	CORE	1.04
E0336	BULK	72.46	CORE	1.50
E0337	BULK	72.96	CORE	1.13
E0338	BULK	73.66	CORE	1.42
E0341	BULK	74.16	CORE	1.46
E0340	BULK	74.76	CORE	1.81
E0343	BULK	75.68	CORE	0.73
E0344	BULK	76.68	CORE	0.89
E0346	BULK	77.68	CORE	1.45
E0347	BULK	79.21	CORE	1.72
E0351	BULK	79.21	CORE	0.93
E0350	BULK	80.41	CORE	0.37
E0352	BULK	80.41	CORE	0.72
E0353	BULK	84.99	CORE	0.40
E0354	BULK	86.29	CORE	1.02
E0361	BULK	88.33	CORE	0.38
E0365	BULK	90.04	CORE	0.90
E0367	BULK	90.91	CORE	1.54
E0369	BULK	91.71	CORE	1.05
E0371	BULK	92.61	CORE	1.30
E0376	BULK	93.11	CORE	2.71
E0378	BULK	93.97	CORE	1.56
E0380	BULK	94.97	CORE	1.38
E0382	BULK	95.97	CORE	1.70
E0383	BULK	97.03	CORE	1.35
E0384	BULK	98.03	CORE	1.22
E0387	BULK	99.03	CORE	0.43
E0389	BULK	101.79	CORE	0.18

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Table III.4.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0394	BULK	104.00	CORE	0.40
E0396	BULK	106.81	CORE	0.20
E0399	BULK	108.48	CORE	1.64
E0403	BULK	111.38	CORE	0.77
E0409	BULK	114.46	CORE	1.07
E0409	EOM	114.46	CORE	0.52
E0412	BULK	116.47	CORE	0.23
E0413	BULK	117.39	CORE	0.39
E0415	BULK	118.77	CORE	0.29
E0417	BULK	120.87	CORE	0.35
E0438	BULK	122.64	CORE	0.89
E0441	BULK	124.85	CORE	0.68
E0443	BULK	127.80	CORE	0.93
E0445	BULK	129.63	CORE	0.25
E0448	BULK	131.50	CORE	0.36
E0451	BULK	135.22	CORE	0.19
E0455	BULK	139.33	CORE	0.22
E0456	BULK	139.52	CORE	0.42
E0457	BULK	140.90	CORE	1.01
E0458	BULK	141.85	CORE	0.32
E0459	BULK	142.91	CORE	0.51
E0464	BULK	147.50	CORE	0.20
E0465	BULK	149.70	CORE	0.36
E0469	BULK	152.25	CORE	0.31
E0420	BULK	155.51	CORE	1.03
E0422	BULK	156.81	CORE	0.26
E0423	BULK	158.29	CORE	0.23
E0427	BULK	162.01	CORE	0.68
E0429	BULK	164.84	CORE	0.57
E0431	BULK	166.99	CORE	0.32
E0436	BULK	171.56	CORE	0.19
E0476	BULK	174.45	CORE	0.33
E0479	BULK	176.02	CORE	1.17
E0480	BULK	177.12	CORE	0.16
E0496	BULK	181.62	CORE	0.39

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Table III.4.4 DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0303	BULK	55.91	CORE	0.04	0.51	1.14	1.13	45	100	0.55	0.07	420*
E0304	BULK	56.90	CORE	0.04	0.33	1.32	1.14	28	115	0.37	0.10	413*
E0305	BULK	57.94	CORE	0.03	0.45	0.90	1.03	43	87	0.48	0.06	422*
E0311	BULK	58.63	CORE	0.03	0.44	1.30	1.64	26	79	0.47	0.06	425*
E0307	BULK	59.05	CORE	0.04	0.31	1.42	1.30	23	109	0.35	0.11	420*
E0312	BULK	59.48	CORE	0.04	0.31	0.96	0.99	31	96	0.35	0.11	415*
E0315	BULK	60.86	CORE	0.04	0.71	1.28	1.59	44	80	0.75	0.05	428*
E0317	BULK	63.64	CORE	0.04	0.39	0.88	1.24	31	70	0.43	0.09	416*
E0322	BULK	64.64	CORE	0.04	0.37	0.61	1.39	26	43	0.41	0.09	421*
E0324	BULK	65.64	CORE	0.02	0.45	0.65	1.65	27	39	0.47	0.04	421*
E0325	BULK	66.63	CORE	0.09	0.29	0.72	1.67	17	43	0.38	0.23	415*
E0326	BULK	67.63	CORE	0.04	0.32	0.71	1.40	22	50	0.36	0.11	413*
E0329	BULK	68.63	CORE	0.04	0.36	0.46	1.76	20	26	0.40	0.10	420*
E0330	BULK	69.75	CORE	0.04	0.71	0.59	2.17	32	27	0.75	0.05	424*
E0333	BULK	70.75	CORE	0.01	0.30	0.50	1.73	17	28	0.31	0.03	420*
E0335	BULK	71.75	CORE	0.02	0.22	0.29	1.04	21	27	0.24	0.08	422*
E0336	BULK	72.46	CORE	0.03	0.44	0.68	1.50	29	45	0.47	0.06	416*
E0337	BULK	72.96	CORE	0.03	0.31	0.63	1.13	27	55	0.34	0.08	417*
E0338	BULK	73.66	CORE	0.04	0.40	0.69	1.42	28	48	0.44	0.09	413*
E0341	BULK	74.16	CORE	0.04	0.55	0.75	1.46	37	51	0.59	0.06	418*
E0340	BULK	74.76	CORE	0.03	0.74	0.59	1.81	40	32	0.77	0.03	423*
E0343	BULK	75.68	CORE	0.02	0.01	0.54	0.73	1	73	0.03	0.66	347**
E0344	BULK	76.68	CORE	0.04	0.05	0.49	0.89	5	55	0.09	0.44	325**
E0346	BULK	77.68	CORE	0.02	0.27	0.70	1.45	18	48	0.29	0.06	418*
E0347	BULK	79.21	CORE	0.00	0.46	2.53	1.72	26	147	0.46	0.00	419**
E0351	BULK	79.21	CORE	0.00	0.03	1.57	0.93	3	168	0.03	0.00	381**
E0350	BULK	80.41	CORE	0.01	0.00	0.40	0.37	0	108	0.01	1.00	222**
E0352	BULK	80.41	CORE	0.02	0.00	0.62	0.72	0	86	0.02	1.00	320**
E0353	BULK	84.99	CORE	0.00	0.06	1.20	0.40	15	300	0.06	0.00	438**
E0354	BULK	86.29	CORE	0.01	0.15	1.48	1.02	14	145	0.16	0.06	406**
E0361	BULK	88.33	CORE	0.00	0.12	0.85	0.38	31	223	0.12	0.00	397**
E0365	BULK	90.04	CORE	0.00	0.03	1.07	0.90	3	118	0.03	0.00	334**
E0367	BULK	90.91	CORE	0.01	0.07	0.35	1.54	4	22	0.08	0.12	360**
E0369	BULK	91.71	CORE	0.01	0.18	0.36	1.05	17	34	0.19	0.05	418*
E0371	BULK	92.61	CORE	0.03	0.21	0.80	1.30	16	61	0.24	0.12	415*
E0376	BULK	93.11	CORE	0.02	0.43	0.85	2.71	15	31	0.45	0.04	419*
E0378	BULK	93.97	CORE	0.01	0.10	0.57	1.56	6	36	0.11	0.09	383**
E0380	BULK	94.97	CORE	0.01	0.08	0.65	1.38	5	47	0.09	0.11	345**
E0382	BULK	95.97	CORE	0.02	0.16	0.50	1.70	9	29	0.18	0.11	413*
E0383	BULK	97.03	CORE	0.00	0.14	1.07	1.35	10	79	0.14	0.00	419*
E0384	BULK	98.03	CORE	0.01	0.05	0.40	1.22	4	32	0.06	0.16	367**
E0387	BULK	99.03	CORE	0.01	0.63	0.15	0.43	146	34	0.64	0.01	434*
E0389	BULK	101.79	CORE	0.01	0.02	0.26	0.18	11	144	0.03	0.33	252**
E0394	BULK	104.00	CORE	0.02	0.00	0.15	0.40	0	37	0.02	1.00	386**
E0396	BULK	106.81	CORE	0.02	0.00	0.15	0.20	0	75	0.02	1.00	206**

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

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Table III.4.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH	SAMPLE TYPE	S1	S2	S3	TOC	HYDR. INDEX	OXYG. INDEX	PETR. POTEN.	PROD. INDEX S1/(S1+S2)	Tmax
		(m)		(mg/g rock)			(%)	(mg/g TOC)		S1+S2		(°C)
E0399	BULK	108.48	CORE	0.18	5.52	0.53	1.64	336	32	5.70	0.03	430*
E0403	BULK	111.38	CORE	0.04	1.54	0.15	0.77	200	19	1.58	0.02	430*
E0409	BULK	114.46	CORE	0.03	2.62	0.19	1.07	244	17	2.65	0.01	430*
E0412	BULK	116.47	CORE	0.01	0.00	0.15	0.23	0	65	0.01	1.00	430**
E0438	BULK	122.64	CORE	0.05	1.43	0.34	0.89	160	38	1.48	0.03	428*
E0441	BULK	124.85	CORE	0.03	0.34	0.27	0.68	50	39	0.37	0.08	413*
E0443	BULK	127.80	CORE	0.05	0.57	0.31	0.93	61	33	0.62	0.08	427*
E0445	BULK	129.63	CORE	0.02	0.07	0.11	0.25	28	44	0.09	0.22	387*
E0448	BULK	131.50	CORE	0.01	0.22	0.38	0.36	61	105	0.23	0.04	425*
E0451	BULK	135.22	CORE	0.03	0.24	0.07	0.19	126	36	0.27	0.11	493*
E0455	BULK	139.33	CORE	0.00	0.00	0.54	0.22	0	245	0.00	0.00	403*
E0456	BULK	139.52	CORE	0.03	0.43	0.12	0.42	102	28	0.46	0.06	425*
E0457	BULK	140.90	CORE	0.06	2.25	0.21	1.01	222	20	2.31	0.02	429*
E0458	BULK	141.85	CORE	0.03	0.16	0.17	0.32	50	53	0.19	0.15	424**
E0459	BULK	142.91	CORE	0.02	0.60	0.09	0.51	117	17	0.62	0.03	428*
E0464	BULK	147.50	CORE	0.02	0.13	0.07	0.20	65	35	0.15	0.13	424**
E0465	BULK	149.70	CORE	0.01	0.12	0.04	0.36	33	11	0.13	0.07	420**
E0469	BULK	152.25	CORE	0.01	0.13	0.11	0.31	41	35	0.14	0.07	460**
E0420	BULK	155.51	CORE	0.02	0.35	0.20	1.03	33	19	0.37	0.05	426*
E0422	BULK	156.81	CORE	0.01	0.02	0.15	0.26	7	57	0.03	0.33	387**
E0423	BULK	158.29	CORE	0.01	0.00	0.15	0.23	0	65	0.01	1.00	224**
E0427	BULK	162.01	CORE	0.01	0.24	0.15	0.68	35	22	0.25	0.04	430*
E0429	BULK	164.84	CORE	0.01	0.31	0.15	0.57	54	26	0.32	0.03	415*
E0431	BULK	166.99	CORE	0.00	0.01	0.38	0.32	3	118	0.01	0.00	276**
E0436	BULK	171.56	CORE	0.00	0.02	0.19	0.19	10	100	0.02	0.00	276**
E0476	BULK	174.45	CORE	0.00	0.13	0.04	0.33	39	12	0.13	0.00	457**
E0479	BULK	176.02	CORE	0.01	2.31	0.28	1.17	197	23	2.32	0.00	431*
E0480	BULK	177.12	CORE	0.00	0.00	0.21	0.16	0	131	0.00	0.00	225**
E0496	BULK	181.62	CORE	0.01	0.24	0.08	0.39	61	20	0.25	0.04	424*

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6206/02-U-01
Date : 88.10.13

Table III.4.5a WEIGHT OF CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ROCK EXTR. (g)	EOM (mg)	ASPH (mg)	SAT HC (mg)	ARO HC (mg)	POLAR COMP. (mg)	HC (mg)	NONHC (mg)	TOC (%)
E0409	EOM	114.46	CORE	78.3	22.7	4.9	6.1	1.3*	9.4	7.4	15.3	0.52

* Unreliable weight of aromatics

Table III.4.5b
CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm of rock)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0409	EOM	114.46	CORE	290	63	78	17*	120	95	195

Table III.4.5c CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0409	EOM	114.46	CORE	55.8	12.0	15.0	3.3*	23.1	18.3	37.5

* Unreliable concentration of aromatics due to low weight

Table III.4.5d
COMPOSITION OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ASPH / EOM (%)	SAT / EOM (%)	ARO / EOM (%)	HC / EOM (%)	POLAR / EOM (%)	SAT / ARO x 100	HC / NONHC x 100
E0409	EOM	114.46	CORE	21.6	26.9	5.9*	32.8	41.4	454.5*	48.7

* Unreliable ARO/EOM and SAT/ARO due to low weight of aromatics.

Table III.4.6a *Molecular ratios from peak heights in mass chromatograms. Hopenes/hopanes m/z 191. Branched/cycloalkane fractions in extracts. Core 6206/02-U-01*

Sample no.	Depth (m)	C_{27}-17β/17α[1]	C_{27}-18α/17α[2] (Tm/Ts)	αβ/αβ+ββ[3]	ββ/αβ+ββ[4]	$C_{30:1}/C_{30}$-αβ[5]	C_{27}-17β/	C_{30}-ββ/	C_{31}-ββ[6]
E-409	114.46	2.2	0.2	0.67	0.33	2.3	42.9	26.9	30.4

1 Peak 4/3
2 Peak 2/3
3 Peak 8/8+12, C_{30}-isomers
4 Peak 12/8+12
5 Peak 9/8
6 % distribution of peaks 4/12/13

Table III.4.6b *Molecular ratios from heights in mass chromatograms. Sterenes/steranes m/z 217, 257. Branched/cycloalkane fractions in extracts. Core 6206/02-U-01*

Sample no.	Depth (m)	C_{29}-sterane isomers[1]	$\%C_{27}$ / C_{28} / C_{29}[2]	Rearr.sterenes/steranes[3]
E-409	114.46	-	- - -	-

1 Peak 6/6+7, % (βαα20R+αββ20R)(βαα20R+αββ20R+ααα20R)
2 % distribution of peaks 3/5/7
3 Intensity in m/z 257/m/z 217

IKU SINTEF-GRUPPEN

Well number: 6206/02-U-01
Reference number:21.3434.24

Table III.4.7 HUMINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	REL RAT	STANDARD DEVIATION	FLUORESCENCE
E-306	------	58.70	0.23 (20)	G	0.04	---
E-366	------	89.62	0.37 (30)	G	0.04	2-3
E-377	------	93.27	0.42 (30)	G	0.06	---
E-385	------	98.35	0.30 (27)	G	0.05	---
E-392	------	103.28	0.35 (30)	G	0.06	2-3
E-397	------	106.96	0.31 (30)	G	0.05	2,3-4
E-411	------	116.05	0.33 (30)	G	0.06	1-2
E-437	------	121.78	0.39 (4)	P	0.12	1?
E-449	------	131.87	0.34 (24)	G	0.07	1-3
E-454	------	139.01	0.32 (30)	G	0.03	1-4
E-461	------	145.15	0.25 (25)	G	0.04	1
E-488	------	174.37	0.31 (30)	G	0.06	1?
E-494	------	178.95	0.33 (30)	G	0.05	3?

REL RAT (Reliability Rating): G = Good; F = Fair; P = Poor;
LRV = Low Reflecting Vitrinite; HRV = High Reflecting Vitrinite; LRM = Low Reflecting Material; I = Inertinite.

IKU SINTEF-GRUPPEN

FIGURES

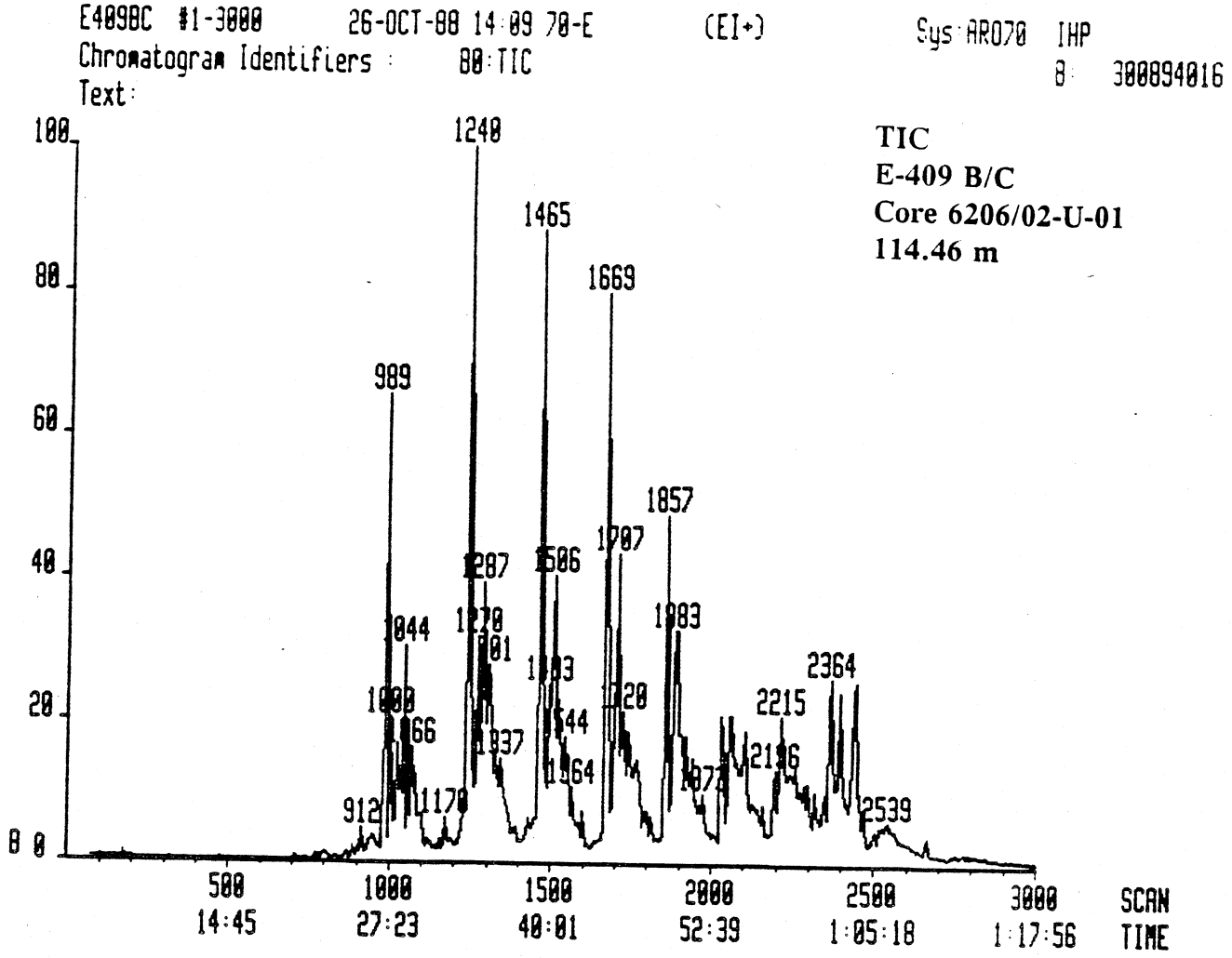
Figure III.4.1

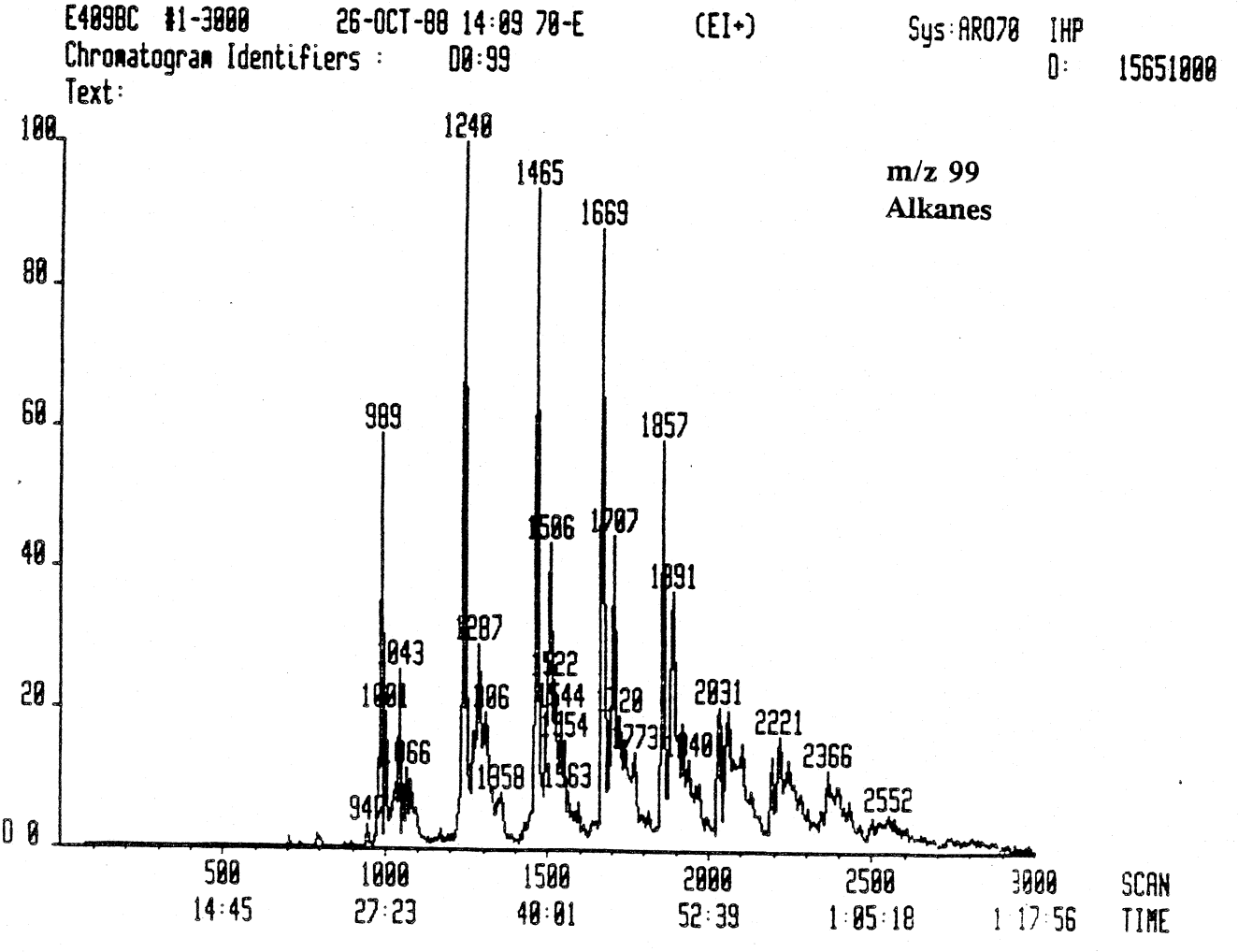
GC-MS of branched/cycloalkanes in extract

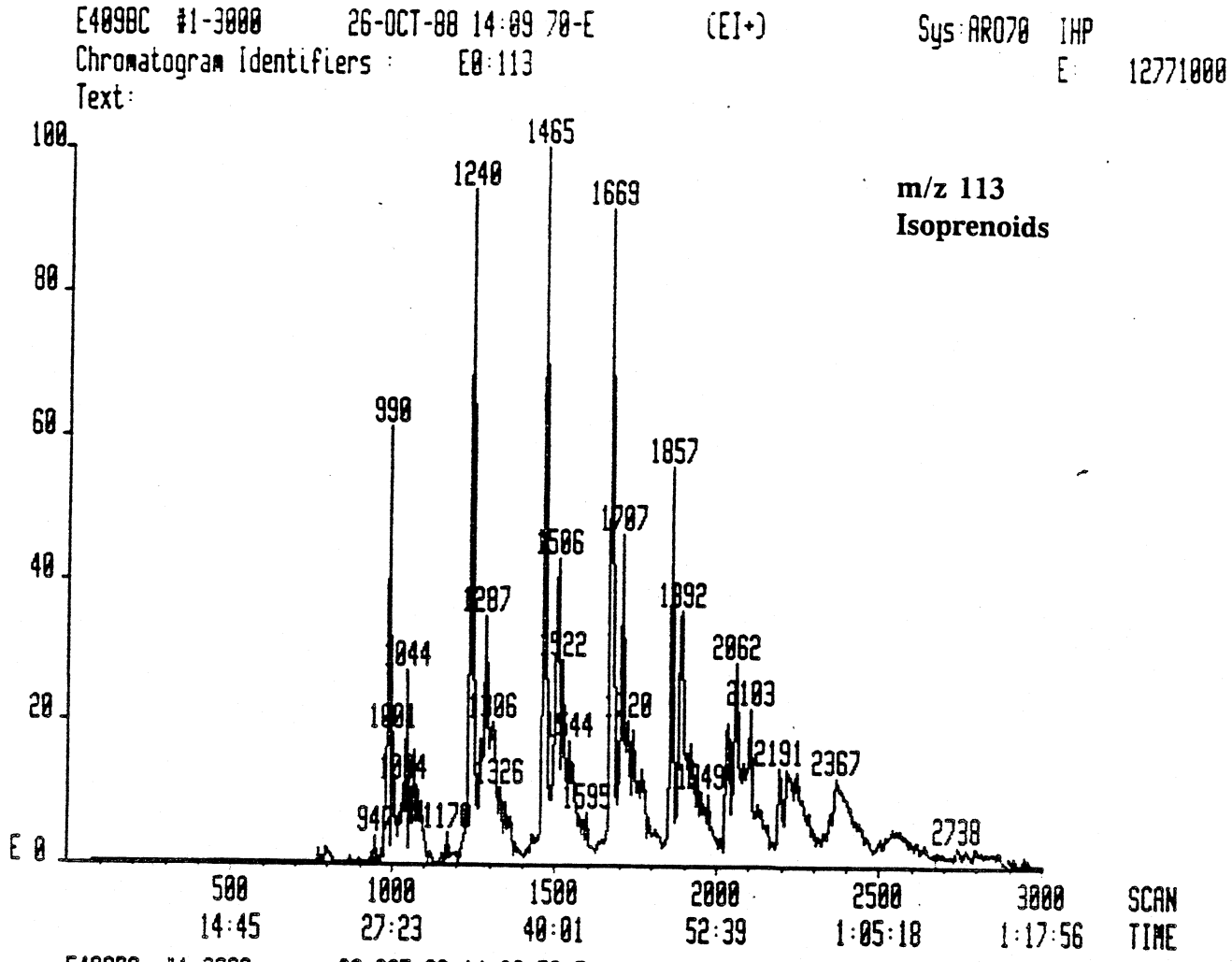
TIC, m/z 99, 113, 183, 191, 217, 257

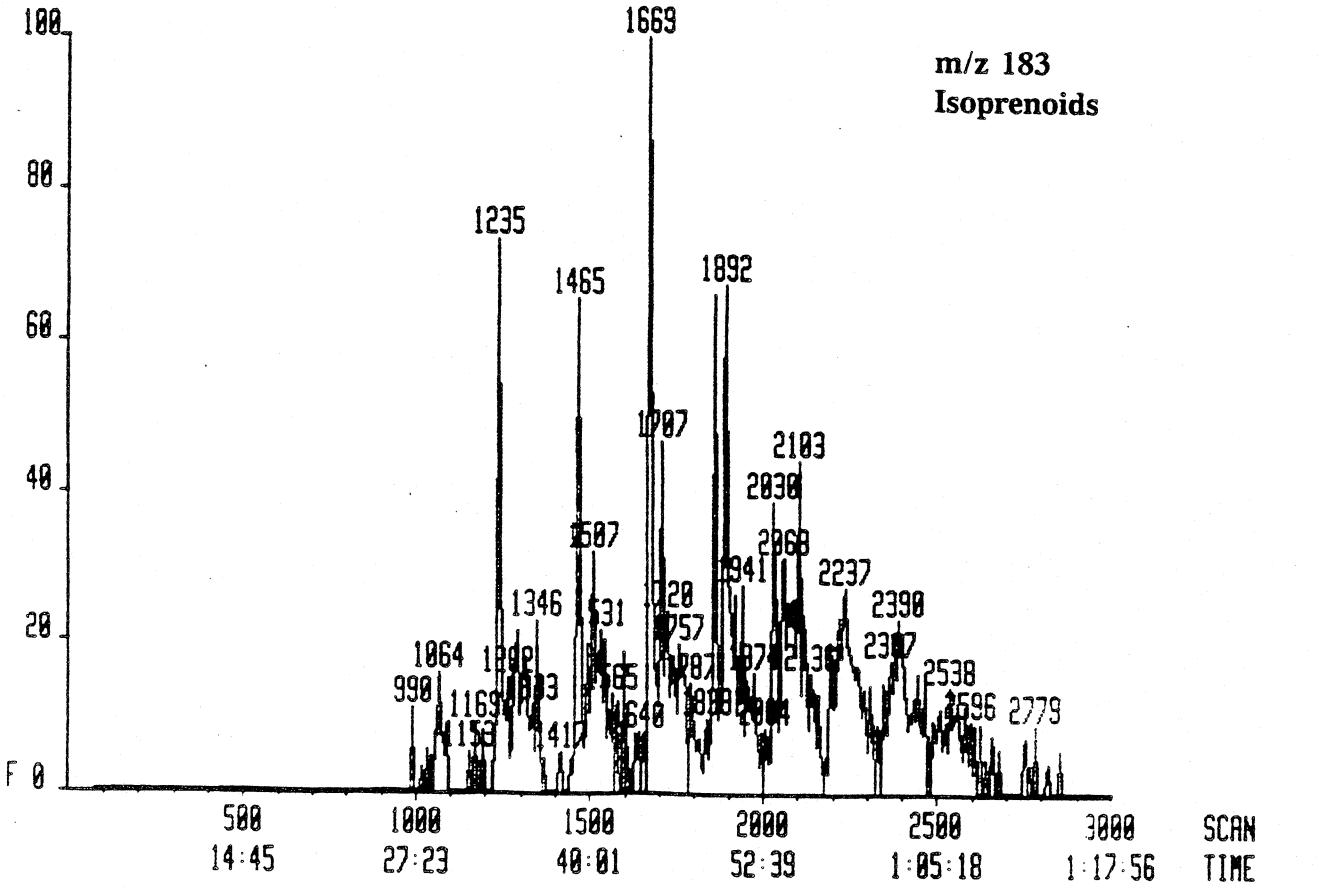
(Identification of peaks, see section II)

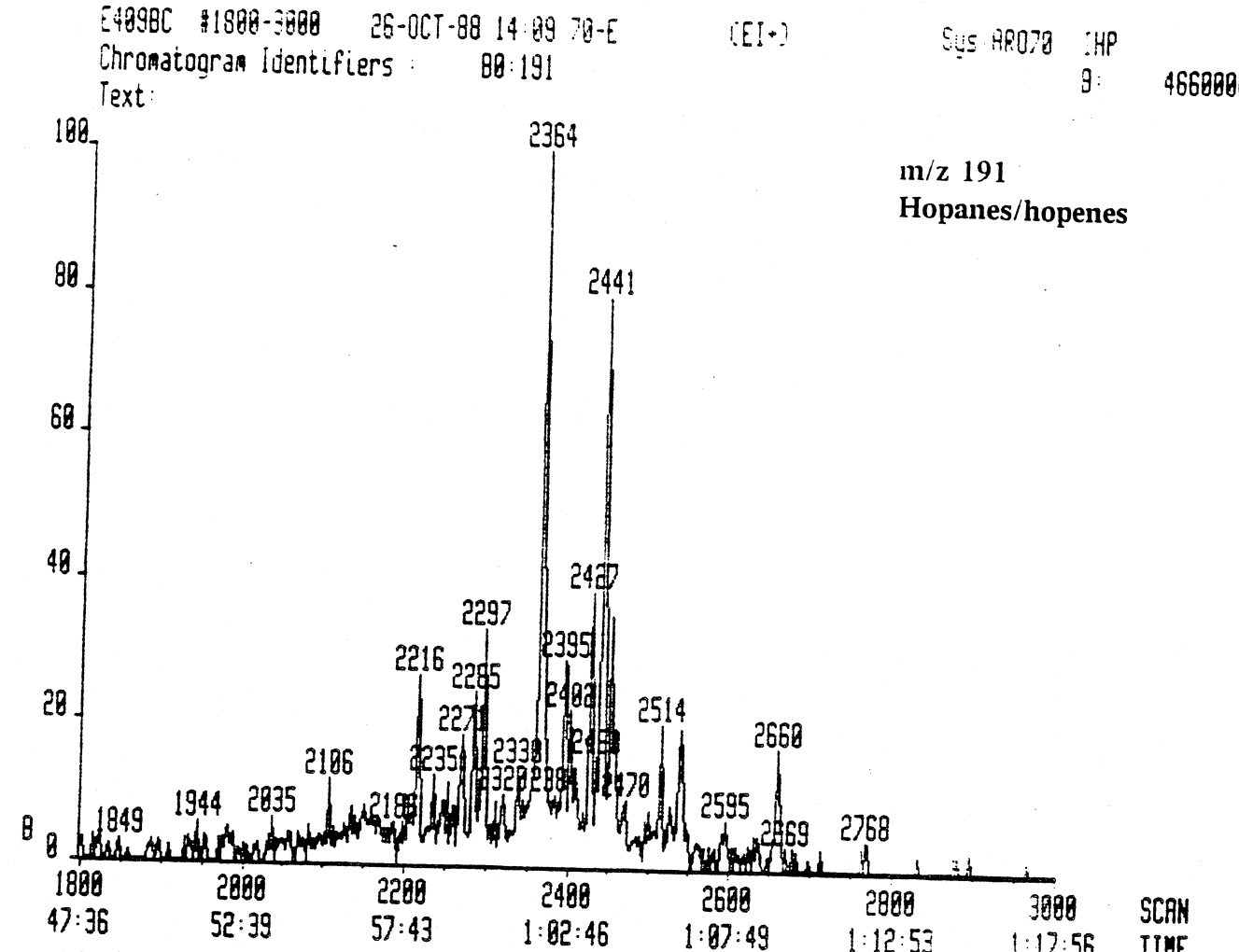
E-409

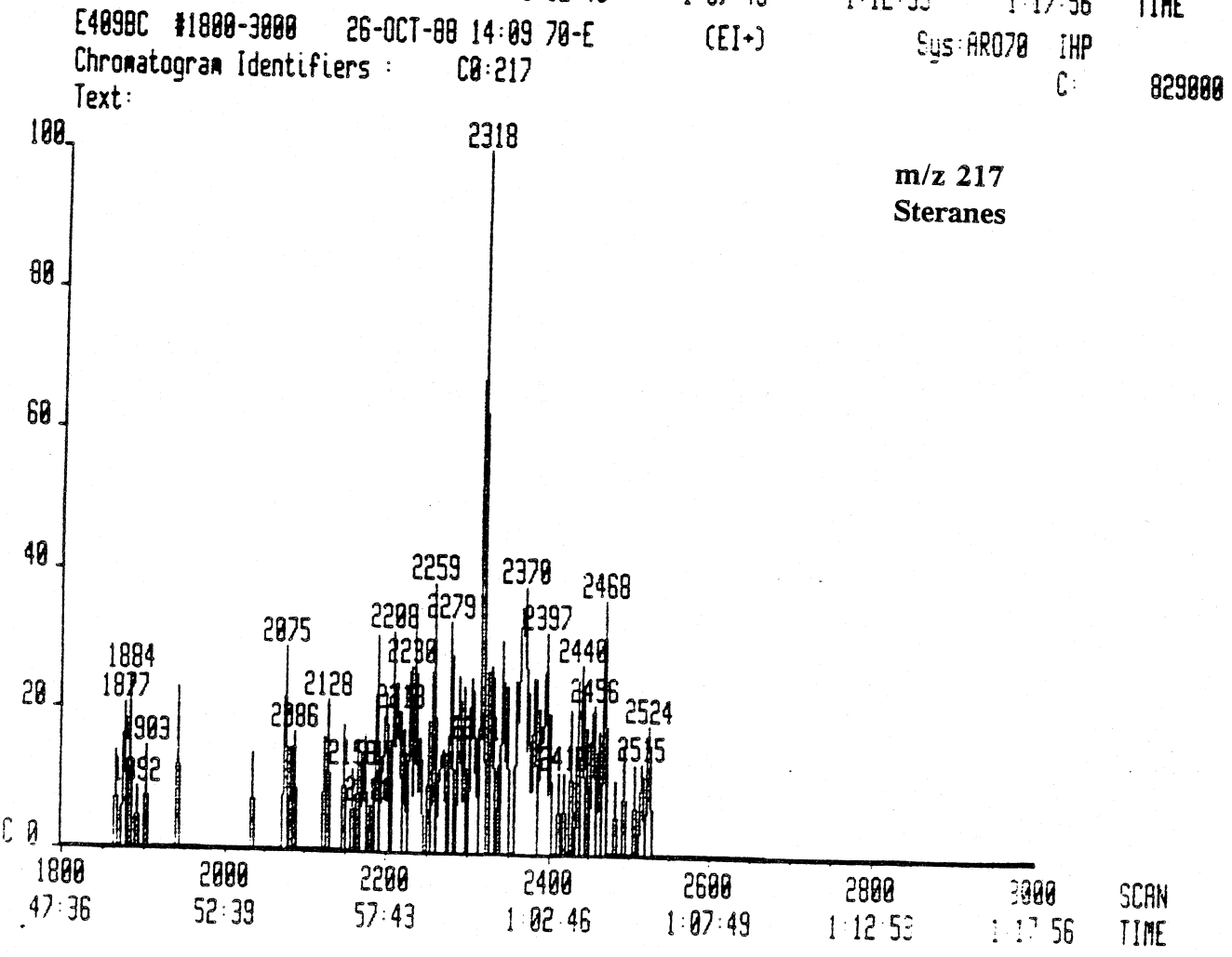

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Chromatogram Identifiers : 88:TIC
B: 300894016
Text:
TIC
E-409 B/C
Core 6206/02-U-01
114.46 m
100
80
60
40
20
0
1240
1465
1669
989
1857
1707
1506
1287
1044
1883
2364
2215
2539
912
1179
SCAN
TIME
500 1000 1500 2000 2500 3000
14:45 27:23 40:01 52:39 1:05:18 1:17:56

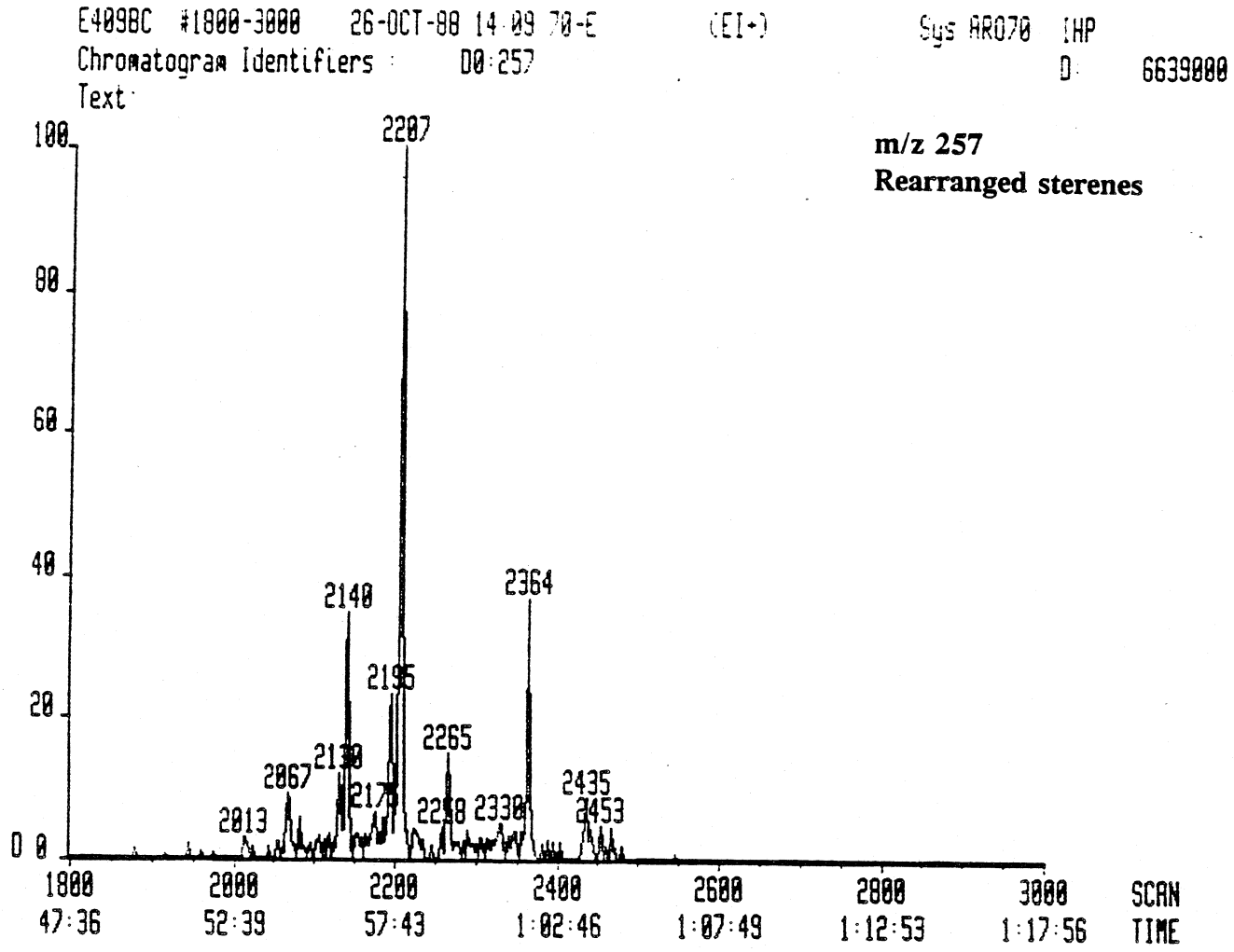

E4098C #1-3000 26-OCT-88 14:09 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : 00:99
D: 15651000
Text:
m/z 99
Alkanes
100
80
60
40
20
0
1240
1465
1669
989
1857
1707
1506
1287
1043
1891
2031
2221
2366
2552
SCAN
TIME
500 1000 1500 2000 2500 3000
14:45 27:23 40:01 52:39 1:05:18 1:17:56


E4098C #1-3000 26-OCT-88 14:09 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : E0:113 E: 12771000
Text:
m/z 113
Isoprenoids
1465
1240
1669
990
1857
1044
1892
2062
2103
2191
2367
2738
E 0
500 1000 1500 2000 2500 3000 SCAN
14:45 27:23 40:01 52:39 1:05:18 1:17:56 TIME


E4098C #1-3000 26-OCT-88 14:09 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : F0:183 F: 1962000
Text:
m/z 183
Isoprenoids
1669
1235
1465
1892
2103
2237
2390
2538
2779
F 0
500 1000 1500 2000 2500 3000 SCAN
14:45 27:23 40:01 52:39 1:05:18 1:17:56 TIME


E4098C #1800-3000 26-OCT-88 14:09 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : B0:191
Text:
B: 4660000
m/z 191
Hopanes/hopenes
SCAN
TIME


E4098C #1800-3000 26-OCT-88 14:09 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:217
Text:
C: 829000
m/z 217
Steranes
SCAN
TIME



m/z 257
Rearranged sterenes

IKU SINTEF-GRUPPEN

Figure III.4.2

Huminite reflectance histograms

Key:

A = Grey-black-brown claystone.
Upper case letters indicate values included in the main population. Lower case letters represent values in other populations.

PP = Statistical data populations
Y = Main population, not necessarily representative of sample maturity,
N = Other populations.

LOW+HIGH = Population limits

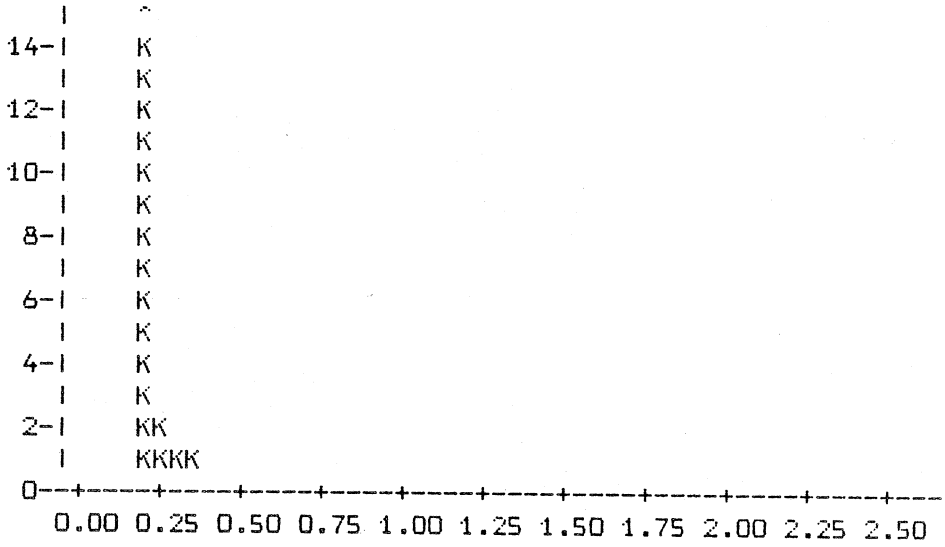
VAL. = Number of measurements in that population

Lithology cross-reference table

A = Clst. gy
B = Clst. dk gy
C = Clst. gn
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbargillite
N = Siltstone
O = Bit
P = X

IKU SINTEF-GRUPPEN

IKU# E-306 58.7M 6206/2-U-1



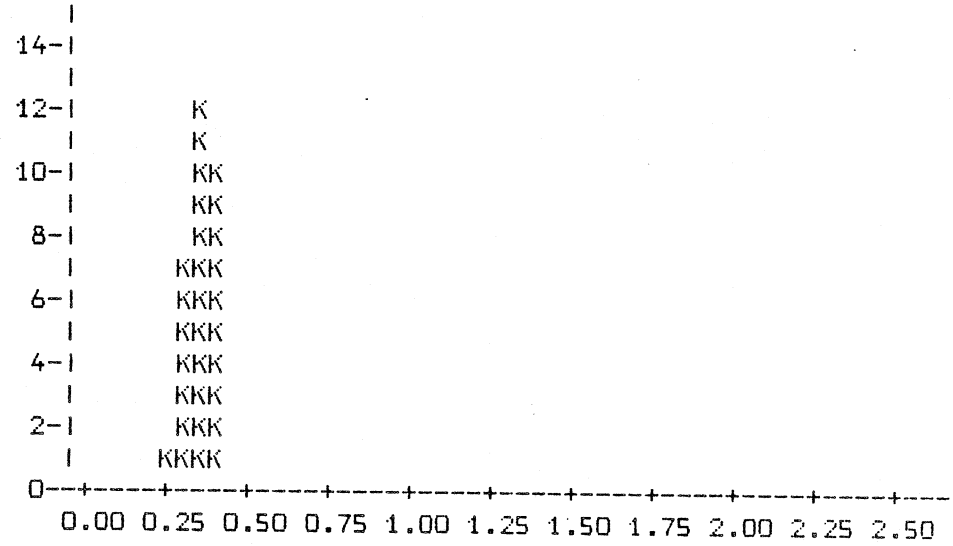
PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.20	0.37	ALL	20	0.23	0.04
			OVERALL	20	0.23	0.04

ORDERED VALUES FOLLOW:

0.20K 0.20K 0.21K 0.21K 0.21K 0.21K 0.22K 0.22K 0.22K 0.22K 0.22K
0.23K 0.23K 0.24K 0.24K 0.24K 0.25K 0.25K 0.31K 0.36K

IKU
SINTEF-GRUPPEN

IKU# E-366 89.6M 6206/2-U-1



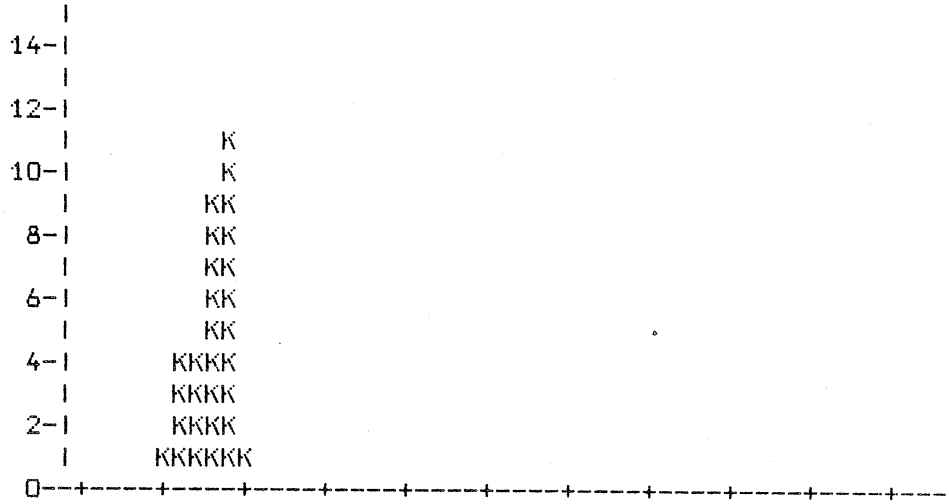
PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.26	0.45	ALL	30	0.37	0.04
			OVERALL	30	0.37	0.04

ORDERED VALUES FOLLOW:

0.26K 0.30K 0.31K 0.33K 0.33K 0.34K 0.34K 0.34K 0.35K 0.35K 0.35K
0.36K 0.37K 0.37K 0.37K 0.38K 0.38K 0.39K 0.39K 0.39K 0.41K 0.41K
0.42K 0.42K 0.42K 0.42K 0.43K 0.43K 0.43K 0.44K

IKU
SINTEF-GRUPPEN

IKU# E-377 93.3M 6206/2-U-1

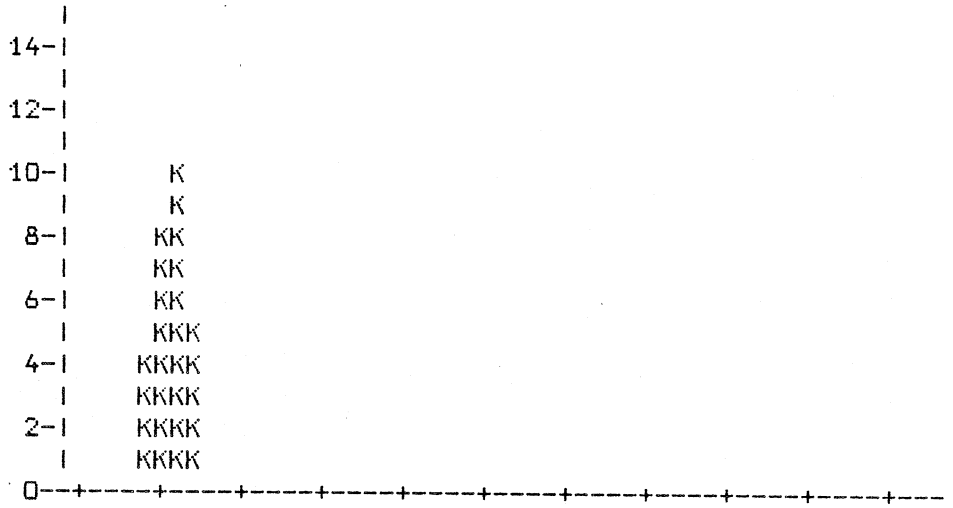


PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.29	0.51	ALL	30	0.42	0.06
			OVERALL	30	0.42	0.06

ORDERED VALUES FOLLOW:

0.29K 0.30K 0.31K 0.33K 0.34K 0.35K 0.36K 0.38K 0.38K 0.41K 0.41K
0.41K 0.42K 0.42K 0.43K 0.43K 0.43K 0.44K 0.45K 0.45K 0.45K 0.45K
0.46K 0.46K 0.47K 0.47K 0.48K 0.49K 0.49K 0.50K

IKU# E-385 98.4M 6206/2-U-1

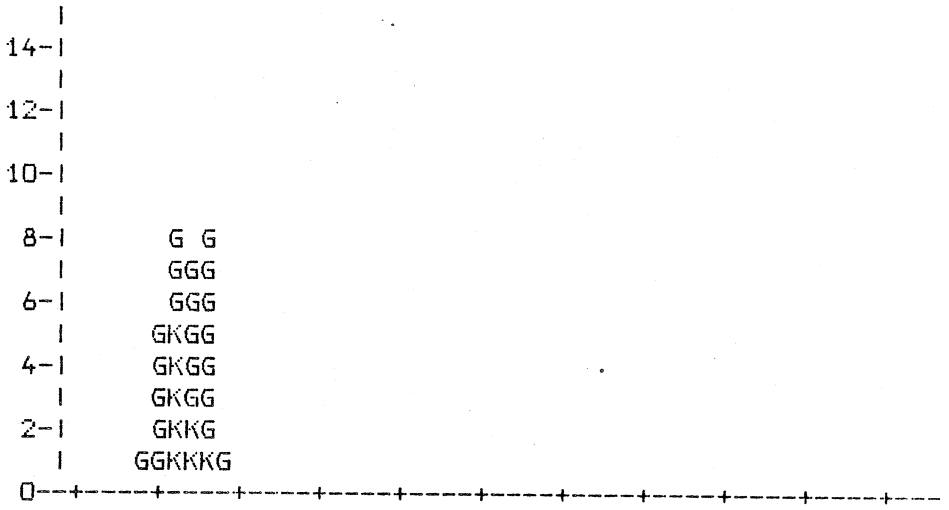


PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.20	0.39	ALL	27	0.30	0.05
			OVERALL	27	0.30	0.05

ORDERED VALUES FOLLOW:

0.20K 0.21K 0.23K 0.24K 0.25K 0.26K 0.26K 0.27K 0.28K 0.28K 0.28K
0.29K 0.30K 0.30K 0.30K 0.30K 0.31K 0.32K 0.33K 0.33K 0.33K 0.33K
0.37K 0.37K 0.38K 0.38K 0.38K

IKU# E-392 103.3M 6206/2-U-1



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.24	0.48	ALL	30	0.35	0.06
			OVERALL	30	0.35	0.06

ORDERED VALUES FOLLOW:

0.24G 0.26G 0.26G 0.28G 0.29G 0.29G 0.30K 0.30K 0.31G 0.31G 0.32K
0.32K 0.33K 0.34G 0.35G 0.35G 0.35G 0.37K 0.38G 0.38G 0.39K 0.40G
0.40K 0.40G 0.42G 0.42G 0.43G 0.43G 0.43G 0.47G

IKU
SINTEF-GRUPPEN

```
IKU# E-397     106.9M 6206/2-U-1
   |       ^
14-|       K
   |       K
12-|       K
   |       K
10-|       K
   |       K
 8-|       K
   |       K
 6-|       K
   |       K
 4-|     K KK
   |     KKKK
 2-|     KKKK
   |     KKKKK
 0--+----+----+----+----+----+----+----+----+----+----+---
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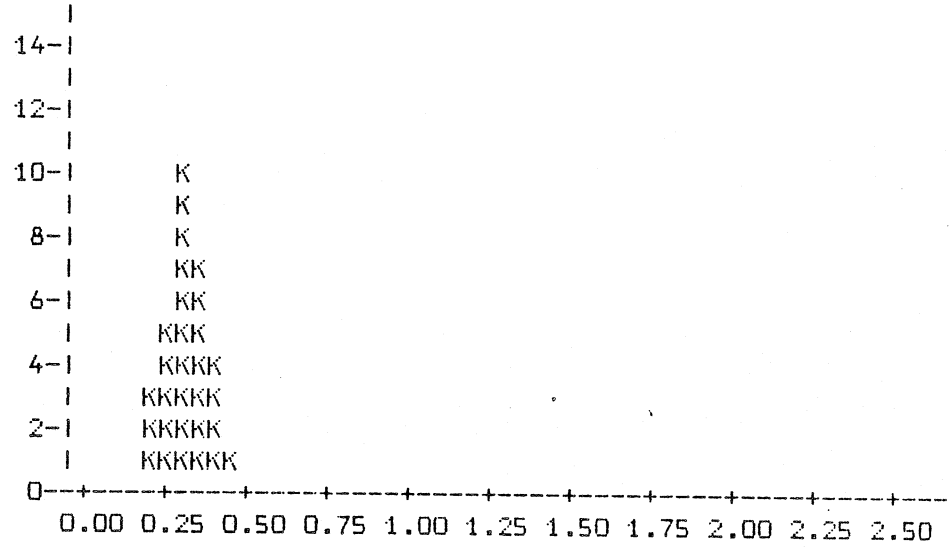
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           OVERALL 30 0.31 0.05

ORDERED VALUES FOLLOW:

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 0.31K 0.31K 0.32K 0.32K 0.32K 0.32K 0.32K 0.33K 0.33K 0.33K 0.34K
 0.34K 0.34K 0.34K 0.35K 0.36K 0.38K 0.38K 0.41K
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IKU
SINTEF-GRUPPEN

IKU# E-411 116.1M 6206/2-U-1



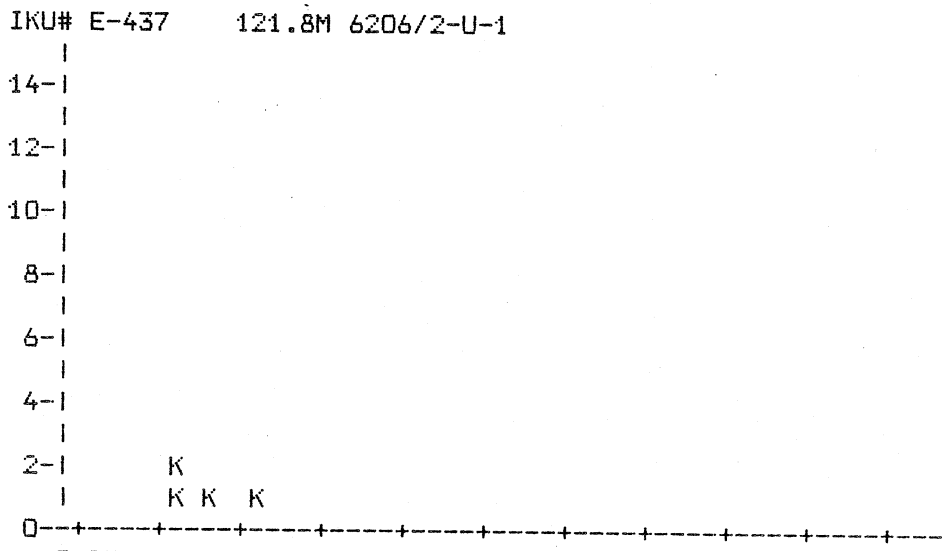
PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.24	0.46	ALL	30	0.33	0.06
			OVERALL	30	0.33	0.06

ORDERED VALUES FOLLOW:

0.24K 0.24K 0.24K 0.25K 0.25K 0.26K 0.28K 0.29K 0.30K 0.31K 0.31K
0.31K 0.32K 0.33K 0.33K 0.33K 0.33K 0.33K 0.35K 0.36K 0.37K 0.37K
0.37K 0.37K 0.39K 0.41K 0.42K 0.43K 0.44K 0.45K

IKU
SINTEF-GRUPPEN

IKU# E-437 121.8M 6206/2-U-1



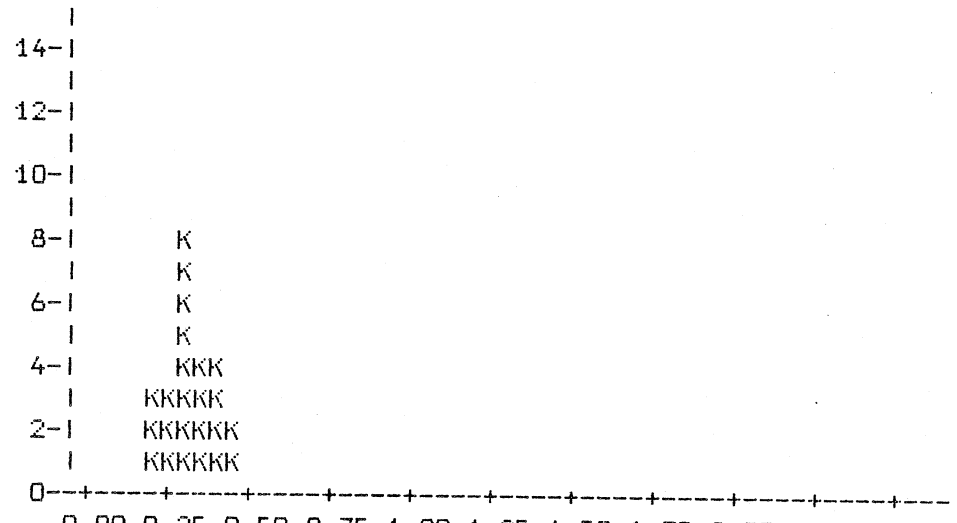
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Y	0.30	0.56	ALL	4	0.39	0.12
			OVERALL	4	0.39	0.12

ORDERED VALUES FOLLOW:

0.30K 0.31K 0.41K 0.55K

IKU SINTEF-GRUPPEN

IKU# E-449 131.9M 6206/2-U-1



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.22	0.48	ALL	24	0.34	0.07
			OVERALL	24	0.34	0.07

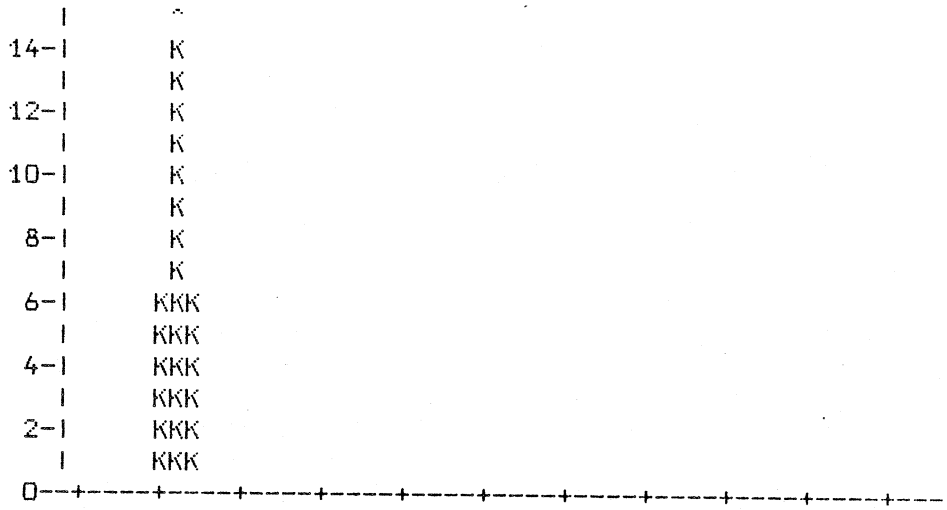
ORDERED VALUES FOLLOW:

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0.34K 0.34K 0.34K 0.35K 0.36K 0.36K 0.37K 0.40K 0.40K 0.41K 0.42K
0.45K 0.47K

IKU

SINTEF-GRUPPEN

IKU# E-454 139.0M 6206/2-U-1



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.28	0.40	ALL	30	0.32	0.03
			OVERALL	30	0.32	0.03

ORDERED VALUES FOLLOW:

0.28K 0.28K 0.28K 0.29K 0.29K 0.29K 0.30K 0.30K 0.30K 0.30K 0.31K
0.31K 0.31K 0.31K 0.31K 0.31K 0.32K 0.32K 0.32K 0.33K 0.33K 0.33K
0.34K 0.34K 0.35K 0.37K 0.37K 0.38K 0.38K 0.39K

IKU SINTEF-GRUPPEN

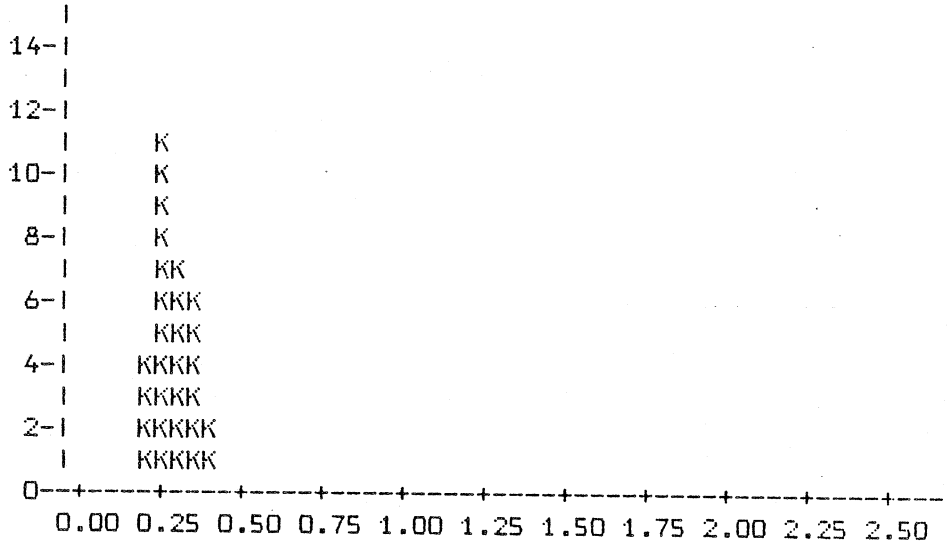
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IKU# E-461     145.2M 6206/2-U-1
   |
14-|
   |
12-|      K
   |     GK
10-|     KK
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 8-|     KK
   |     KK
 6-|     KK
   |     KK
 4-|     KK
   |     KK
 2-|     KKK
   |     KKK
 0--+----+----+----+----+----+----+----+----+----+----+---
   0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

PP LOW HIGH LIT #VAL MEAN STDV
Y 0.20 0.35 ALL   25 0.25 0.04
          OVERALL 25 0.25 0.04

ORDERED VALUES FOLLOW:

 0.20K 0.21K 0.21K 0.21K 0.21K 0.21K 0.22K 0.22K 0.23K 0.23G 0.24K
 0.25K 0.25K 0.26K 0.27K 0.27K 0.28K 0.28K 0.28K 0.28K 0.29K 0.29K
 0.29K 0.30K 0.34K
```

IKU# E-488 174.4M 6206/2-U-1



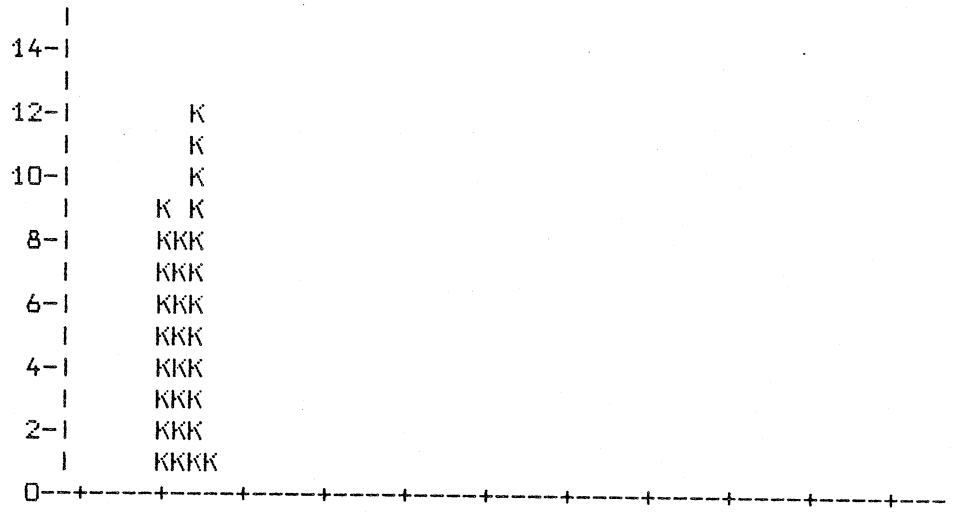
PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.23	0.45	ALL	30	0.31	0.06
			OVERALL	30	0.31	0.06

ORDERED VALUES FOLLOW:

0.23K 0.23K 0.23K 0.24K 0.25K 0.25K 0.26K 0.27K 0.27K 0.28K 0.28K
0.28K 0.28K 0.28K 0.28K 0.30K 0.31K 0.31K 0.32K 0.33K 0.33K 0.34K
0.35K 0.35K 0.37K 0.37K 0.37K 0.38K 0.41K 0.44K

IKU SINTEF-GRUPPEN

IKU# E-494 180.9M 6206/2-U-1



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.26	0.41	ALL	30	0.33	0.05
			OVERALL	30	0.33	0.05

ORDERED VALUES FOLLOW:

0.26K 0.27K 0.28K 0.28K 0.28K 0.28K 0.28K 0.28K 0.29K 0.30K 0.31K
0.31K 0.32K 0.32K 0.33K 0.33K 0.34K 0.35K 0.35K 0.36K 0.37K 0.37K
0.38K 0.39K 0.39K 0.39K 0.39K 0.39K 0.39K 0.40K

IKU SINTEF-GRUPPEN

III.5 CORE 6307/07-U-03A

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TABLES

Core 6307/07-U-03A(03)

Table III.5.1 Analytical programme, follow-up analyses Argillaceous rocks

IKU no.	Depth (m)	HI	TOC	1 VI	2 TAI/ SCI	3 Extr.	4 MPLC	5 CGC-SAT	6 CGC-ARO	7 Urea add.	8 CGC/ cycl	9 CGC n-alk	10 GC-MS Br./cycl	11 PY-GC-MS (ker)	12 $\delta^{13}C$ (ker)	13 δD (ker)
E-105	9.62			X												
E-130	14.42			X												
E-167	22.10			X												
E-193	30.86	300	4.52			X	X	X						X		
E-214	37.34	157	2.54			X	X	X		X		X	X		X	X
E-227	46.20	558	11.10		X	X	X	X		X		X	X	X	X	
E-229	47.80	623	16.40			X										
E-230	48.77	639	17.80		X	X	X	X		X	X	X	X	X	X	X
E-232	50.79	567	11.7			X	X	X								
E-234	51.36	371	8.03			X	X	X								
E-235	52.36	591	9.83		X	X	X	X		X		X			X	X
E-239	55.20	403	5.56		X	X	X	X		X		X	X	X	X	
E-240	56.26	376	5.37			X	X	X	X							
E-249	60.83	256	3.80		X	X				X		X	X	X	X	
E-253	62.83	452	6.82		X	X	X	X		X		X	X	X	X	
E-265	70.52	495	8.29		X	X	X	X		X		X	X	X	X	
E-266	71.52	448	10.40			X	X	X								X
E-276	78.17				X											
E-280	79.91	310	9.43			X	X	X								
Total number of samples						15	13	13	1	8	1	8	7	7	8	4

IKU SINTEF-GRUPPEN

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Location : 6307/07-U-03A
Date : 88.10.12

Table III.5.2a TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0160	20.08	107	0	0	0	0	0	107	0	0.0	
E0179	25.95	426	0	0	0	0	0	426	0	0.0	
E0197	32.16	1484	35	8	0	0	0	1527	43	2.8	
E0246	58.65	4968	180	52	0	0	0	5200	232	4.5	
E0272	76.68	2886	214	714	13	13	0	3840	954	24.8	1.00

Location : 6307/07-U-03

TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0104	9.58	0	0	0	0	0	0	0	0		
E0128	15.01	7	0	0	0	0	0	7	0	0.0	
E0152	21.15	173	0	0	0	0	0	173	0	0.0	

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6307/07-U-03A
Date : 88.10.12

Table III.5.2b TABLE OF GAS RESULTS

Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0160	20.08	464	38	21	0	0	0	523	59	11.3	
E0179	25.95	2021	125	87	13	0	116	2246	225	10.0	
E0197	32.16	4744	495	381	114	146	351	5880	1136	19.3	0.78
E0246	58.65	9396	1388	1235	218	323	609	12560	3164	25.2	0.67
E0272	76.68	9606	2051	1623	341	360	755	13981	4375	31.3	0.95

Location : 6307/07-U-03

TABLE OF GAS RESULTS

Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0104	9.58	214	34	12	0	0	0	260	46	17.7	
E0128	15.01	249	39	12	0	0	39	300	51	17.0	
E0152	21.15	351	36	12	0	0	90	399	48	12.0	

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6307/07-U-03A
Date : 88.10.12

Table III.5.2c TABLE OF GAS RESULTS

Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0160	20.08	571	38	21	0	0	0	630	59	9.4	
E0179	25.95	2447	125	87	13	0	116	2672	225	8.4	
E0197	32.16	6228	530	389	114	146	351	7407	1179	15.9	0.78
E0246	58.65	14364	1568	1287	218	323	609	17760	3396	19.1	0.67
E0272	76.68	12492	2265	2337	354	373	755	17821	5329	29.9	0.95

Location : 6307/07-U-03

TABLE OF GAS RESULTS

Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0104	9.58	214	34	12	0	0	0	260	46	17.7	
E0128	15.01	256	39	12	0	0	39	307	51	16.6	
E0152	21.15	524	36	12	0	0	90	572	48	8.4	

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Location : 6307/07-U-03A
Date : 88.10.20

Table III.5.3 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0154	BULK	18.82	CORE	1.70
E0157	BULK	19.64	CORE	1.61
E0161	BULK	20.24	CORE	1.67
E0162	BULK	20.91	CORE	2.55
E0166	BULK	21.80	CORE	1.88
E0170	BULK	22.83	CORE	3.21
E0172	BULK	23.87	CORE	2.74
E0175	BULK	24.96	CORE	1.92
E0177	BULK	25.46	CORE	1.42
E0178	BULK	25.94	CORE	2.89
E0179	BULK	25.95	CORE	3.23
E5260	BULK	26.20	CORE	4.26
E0180	BULK	26.46	CORE	4.31
E0181	BULK	26.96	CORE	4.75
E5265	BULK	27.50	CORE	2.20
E0182	BULK	27.80	CORE	3.00
E0185	BULK	28.30	CORE	2.40
E0187	BULK	28.80	CORE	4.10
E0188	BULK	29.30	CORE	3.43
E0189	BULK	29.80	CORE	3.27
E0191	BULK	30.20	CORE	4.20
E0193	BULK	30.86	CORE	4.52
E0193	FOLLOW-UP	30.86	CORE	4.40
E0194	BULK	31.36	CORE	5.05
E0196	BULK	31.86	CORE	4.63
E0197	BULK	32.16	CORE	4.66
E0198	BULK	32.36	CORE	4.13
E0200	BULK	32.86	CORE	5.62
E0201	BULK	33.26	CORE	4.13
E5283	BULK	33.50	CORE	4.80
E0203	BULK	33.89	CORE	4.37
E0204	BULK	34.39	CORE	3.66
E0205	BULK	34.89	CORE	1.48
E0207	BULK	35.39	CORE	1.87
E5289	BULK	35.60	CORE	2.83
E0209	BULK	35.89	CORE	3.15
E5290	BULK	36.15	CORE	2.79
E0210	BULK	36.39	CORE	2.62
E5292	BULK	36.60	CORE	2.05
E0213	BULK	36.84	CORE	2.21
E0214	BULK	37.34	CORE	2.54
E0214	FOLLOW-UP	37.34	CORE	2.61
E0215	BULK	37.84	CORE	2.77

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Table 5.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0217	BULK	38.34	CORE	2.04
E5298	BULK,A	38.60	CORE	2.21
E5298	BULK,B	38.60	CORE	2.25
E0220	BULK	38.84	CORE	2.37
E0221	BULK	39.34	CORE	1.96
E0222	BULK	39.98	CORE	2.10
E5305	BULK	40.50	CORE	1.47
E0224	BULK	41.08	CORE	1.54
E5307	BULK	41.60	CORE	1.98
E0225	BULK	42.08	CORE	1.46
E5312	BULK	42.30	CORE	1.81
E5313	BULK	42.60	CORE	1.78
E5316	BULK	43.00	CORE	3.98
E5318	BULK	43.50	CORE	14.20
E5320	BULK	43.75	CORE	12.10
E5321	BULK	44.00	CORE	10.70
E5323	BULK	44.50	CORE	5.81
E5326	BULK	45.00	CORE	8.31
E5328	BULK	45.50	CORE	6.09
E5618	BULK	45.75	CORE	7.97
E5331	BULK	46.00	CORE	7.11
E0227	BULK	46.20	CORE	11.10
E0227	FOLLOW-UP	46.20	CORE	7.21
E5335	BULK	47.00	CORE	6.00
E5337	BULK	47.50	CORE	15.30
E0229	BULK	47.80	CORE	16.40
E5339	BULK	48.00	CORE	9.69
E5341	BULK	48.50	CORE	8.30
E0230	BULK	48.77	CORE	17.80
E0230	FOLLOW-UP	48.77	CORE	11.60
E5344	BULK	49.25	CORE	8.78
E5345	BULK	49.50	CORE	14.10
E0233	BULK	49.77	CORE	5.74
E5348	BULK	50.25	CORE	4.98
E5349	BULK	50.50	CORE	10.30
E0232	BULK	50.77	CORE	11.70
E0232	EOM	50.77	CORE	9.20
E0234	BULK	51.36	CORE	3.03
E0234	FOLLOW-UP	51.36	CORE	3.36
E5354	BULK	51.85	CORE	5.44
E0235	BULK	52.36	CORE	9.38
E0235	FOLLOW-UP	52.36	CORE	10.30
E5356	BULK	52.60	CORE	8.30

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Table 5.3 (cont.) DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E5358	BULK	52.85	CORE	9.40
E5359	BULK	53.10	CORE	9.21
E0237	BULK	53.36	CORE	6.50
E5360	BULK	53.60	CORE	5.42
E5362	BULK	53.85	CORE	6.48
E0238	BULK	54.26	CORE	9.43
E5364	BULK	54.50	CORE	10.70
E5367	BULK	55.00	CORE	8.20
E0239	BULK	55.26	CORE	5.56
E0239	FOLLOW-UP	55.26	CORE	5.42
E5368	BULK	55.50	CORE	4.96
E5370	BULK	55.75	CORE	6.04
E0240	BULK	56.26	CORE	5.37
E0240	FOLLOW-UP	56.26	CORE	5.64
E5374	BULK	56.75	CORE	5.23
E0241	BULK	57.36	CORE	3.98
E5378	BULK	57.85	CORE	5.91
E0244	BULK	58.36	CORE	3.29
E0246	BULK	58.65	CORE	5.17
E5382	BULK	58.85	CORE	5.86
E0247	BULK	59.36	CORE	5.25
E5386	BULK	59.85	CORE	6.25
E5388	BULK	60.35	CORE	4.17
E5389	BULK	60.60	CORE	7.41
E0249	BULK	60.83	CORE	3.80
E0249	FOLLOW-UP	60.83	CORE	7.69
E5393	BULK	61.35	CORE	1.34
E0251	BULK	61.83	CORE	4.96
E5398	BULK	62.35	CORE	3.83
E5399	BULK	62.60	CORE	7.00
E0253	BULK	62.83	CORE	6.82
E0253	FOLLOW-UP	62.83	CORE	8.07
E5401	BULK	63.10	CORE	5.10
E0255	BULK	63.43	CORE	5.06
E5404	BULK	63.90	CORE	5.98
E0256	BULK	64.43	CORE	8.84
E5408	BULK	64.90	CORE	5.24
E0258	BULK	65.43	CORE	5.92
E5413	BULK	65.90	CORE	2.42
E0259	BULK	66.53	CORE	6.29
E5418	BULK	67.00	CORE	6.49
E0260	BULK	67.53	CORE	5.67
E5422	BULK	68.00	CORE	4.59
E0262	BULK	68.53	CORE	4.34

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Table 5.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E5426	BULK	69.00	CORE	8.82
E0263	BULK	69.52	CORE	5.30
E5430	BULK	70.00	CORE	7.88
E5434	BULK	70.40	CORE	2.61
E0265	BULK	70.52	CORE	8.29
E0265	FOLLOW-UP	70.52	CORE	9.82
E5436	BULK	70.75	CORE	6.40
E5438	BULK	71.00	CORE	7.99
E5440	BULK	71.25	CORE	11.60
E0266	BULK	71.52	CORE	10.40
E0266	FOLLOW-UP	71.52	CORE	9.41
E5441	BULK	71.75	CORE	8.99
E5442	BULK	72.00	CORE	9.92
E0267	BULK	72.55	CORE	8.66
E5447	BULK	73.00	CORE	5.45
E5450	BULK	73.50	CORE	5.93
E0268	BULK	73.80	CORE	6.78
E0270	BULK	74.45	CORE	6.20
E5454	BULK	75.00	CORE	7.31
E0271	BULK	75.30	CORE	4.79
E5457	BULK	75.85	CORE	6.62
E5459	BULK	76.35	CORE	8.24
E0272	BULK	76.68	CORE	9.14
E5462	BULK	76.85	CORE	7.31
E5463	BULK	77.10	CORE	5.56
E5464	BULK	77.35	CORE	9.30
E0273	BULK	77.67	CORE	6.18
E5467	BULK	78.10	CORE	6.53
E5469	BULK	78.60	CORE	5.96
E0278	BULK	78.92	CORE	8.65
E5471	BULK	79.40	CORE	11.80
E0280	BULK	79.91	CORE	9.43
E0280	FOLLOW-UP	79.91	CORE	7.40
E5474	BULK	80.10	CORE	5.66

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DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0106	SLTST	9.6	CORE	0.54
E0106	SST	9.6	CORE	0.15
E0125	BULK	12.8	CORE	0.16

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Table III.5.4 DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH	SAMPLE TYPE	S1	S2	S3	TOC	HYDR. INDEX	OXYG. INDEX	PETR. POTEN.	PROD. INDEX S1/(S1+S2)	Tmax
		(m)		(mg/g rock)			(%)	(mg/g TOC)		S1+S2		(°C)
E0154	BULK	18.82	CORE	0.18	1.16	0.16	1.70	68	9	1.34	0.13	422
E0157	BULK	19.64	CORE	0.10	0.77	0.16	1.61	47	9	0.87	0.11	425
E0161	BULK	20.24	CORE	0.10	0.82	0.21	1.67	49	12	0.92	0.10	423
E0162	BULK	20.91	CORE	0.22	3.66	0.23	2.55	143	9	3.88	0.05	416
E0166	BULK	21.80	CORE	0.15	0.94	0.39	1.88	50	20	1.09	0.13	422
E0170	BULK	22.83	CORE	0.11	2.91	0.28	3.21	90	8	3.02	0.03	415
E0172	BULK	23.87	CORE	0.16	2.68	0.31	2.74	97	11	2.84	0.05	420
E0175	BULK	24.96	CORE	0.32	0.94	0.57	1.92	48	29	1.26	0.25	416
E0177	BULK	25.46	CORE	0.13	0.99	0.39	1.42	69	27	1.12	0.11	418
E0178	BULK	25.94	CORE	0.15	2.56	0.30	2.89	88	10	2.71	0.05	413
E0179	BULK	25.95	CORE	0.05	3.26	0.46	3.23	100	14	3.31	0.01	425*
E5260	BULK	26.20	CORE	0.13	5.18	0.83	4.26	121	19	5.31	0.02	423
E0180	BULK	26.46	CORE	0.22	5.79	0.44	4.31	134	10	6.01	0.03	417
E0181	BULK	26.96	CORE	0.31	8.15	0.58	4.75	171	12	8.46	0.03	417
E5265	BULK	27.50	CORE	0.03	0.94	0.55	2.20	42	25	0.97	0.03	424*
E0182	BULK	27.80	CORE	0.14	3.44	0.48	3.00	114	16	3.58	0.03	428
E0185	BULK	28.30	CORE	0.28	1.85	0.47	2.40	77	19	2.13	0.13	424
E0187	BULK	28.80	CORE	0.21	9.43	0.46	4.10	230	11	9.64	0.02	424
E0188	BULK	29.30	CORE	0.26	4.95	0.52	3.43	144	15	5.21	0.04	419
E0189	BULK	29.80	CORE	0.23	5.38	0.41	3.27	164	12	5.61	0.04	422
E0191	BULK	30.20	CORE	0.26	10.91	0.48	4.20	259	11	11.17	0.02	420
E0193	BULK	30.86	CORE	0.30	13.58	0.91	4.52	300	20	13.88	0.02	422
E0194	BULK	31.36	CORE	0.31	14.23	1.10	5.05	281	21	14.54	0.02	419
E0196	BULK	31.86	CORE	0.33	12.78	1.11	4.63	276	23	13.11	0.02	421
E0197	BULK	32.16	CORE	0.21	13.69	0.77	4.66	293	16	13.90	0.01	417
E0198	BULK	32.36	CORE	0.31	10.87	0.91	4.13	263	22	11.18	0.02	420
E0200	BULK	32.86	CORE	0.40	17.50	1.20	5.62	311	21	17.90	0.02	419
E0201	BULK	33.26	CORE	0.29	10.41	0.87	4.13	252	21	10.70	0.02	421
E5283	BULK	33.50	CORE	0.21	13.20	1.00	4.80	275	20	13.41	0.01	423
E0203	BULK	33.89	CORE	0.27	11.28	1.05	4.37	258	24	11.55	0.02	419
E0204	BULK	34.39	CORE	0.18	6.66	1.01	3.66	181	27	6.84	0.02	425
E0205	BULK	34.89	CORE	0.12	0.74	0.44	1.48	50	29	0.86	0.13	430
E0207	BULK	35.39	CORE	0.10	2.32	1.12	1.87	124	59	2.42	0.04	428*
E5289	BULK	35.60	CORE	0.06	3.45	0.62	2.83	121	21	3.51	0.01	430*
E0209	BULK	35.89	CORE	0.14	4.76	0.59	3.15	151	18	4.90	0.02	428
E5290	BULK	36.15	CORE	0.05	3.43	0.65	2.79	122	23	3.48	0.01	432*
E0210	BULK	36.39	CORE	0.16	4.36	0.62	2.62	166	23	4.52	0.03	429
E5292	BULK	36.60	CORE	0.05	2.02	0.50	2.05	98	24	2.07	0.02	427*
E0213	BULK	36.84	CORE	0.16	2.92	0.45	2.21	132	20	3.08	0.05	430
E0214	BULK	37.34	CORE	0.22	4.00	0.90	2.54	157	35	4.22	0.05	430
E0215	BULK	37.84	CORE	0.14	5.09	1.17	2.77	183	42	5.23	0.02	427
E0217	BULK	38.34	CORE	0.20	2.79	2.00	2.04	136	98	2.99	0.06	432
E5298	BULK,A	38.60	CORE	0.04	2.03	0.84	2.21	91	38	2.07	0.01	426*
E5298	BULK,B	38.60	CORE	0.07	2.34	0.96	2.25	104	42	2.41	0.02	426*
E0220	BULK	38.84	CORE	0.18	3.14	0.94	2.37	132	39	3.32	0.05	430

* Low S1 and/or S2 peak. PI not reliable.

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6307/07-U-03A
Date : 88.10.28

Table 5.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0221	BULK	39.34	CORE	0.12	3.96	0.30	1.96	202	15	4.08	0.02	428
E0222	BULK	39.98	CORE	0.08	3.43	0.40	2.10	163	19	3.51	0.02	425*
E5305	BULK	40.50	CORE	0.03	0.90	0.43	1.47	61	29	0.93	0.03	426*
E0224	BULK	41.08	CORE	0.07	1.26	0.59	1.54	81	38	1.33	0.05	423*
E5307	BULK	41.60	CORE	0.04	2.22	0.36	1.98	112	18	2.26	0.01	424*
E0225	BULK	42.08	CORE	0.04	1.86	1.04	1.46	127	71	1.90	0.02	427*
E5312	BULK	42.30	CORE	0.03	1.53	0.74	1.81	84	40	1.56	0.01	431*
E5313	BULK	42.60	CORE	0.05	1.54	0.44	1.78	86	24	1.59	0.03	432*
E5316	BULK	43.00	CORE	0.23	13.08	0.62	3.98	328	15	13.31	0.01	431
E5318	BULK	43.50	CORE	1.52	85.30	1.50	14.20	600	10	86.82	0.01	439
E5320	BULK	43.75	CORE	1.46	69.77	1.55	12.10	576	12	71.23	0.02	434
E5321	BULK	44.00	CORE	1.17	62.39	1.42	10.70	583	13	63.56	0.01	427
E5323	BULK	44.50	CORE	0.36	33.82	1.04	5.81	582	17	34.18	0.01	432
E5326	BULK	45.00	CORE	0.52	52.34	1.11	8.31	629	13	52.86	0.00	432
E5328	BULK	45.50	CORE	0.43	30.57	1.09	6.09	501	17	31.00	0.01	431
E5618	BULK	45.75	CORE	0.51	44.26	1.16	7.97	555	14	44.77	0.01	434
E5331	BULK	46.00	CORE	0.43	41.29	1.37	7.11	580	19	41.72	0.01	434
E0227	BULK	46.20	CORE	1.04	61.95	1.01	11.10	558	9	62.99	0.01	432
E0227	BULK	46.20	CORE	1.08	63.93	1.03	11.10	575	9	65.01	0.01	436
E5335	BULK	47.00	CORE	0.41	29.50	1.17	6.00	491	19	29.91	0.01	432
E5337	BULK	47.50	CORE	1.51	100.50	1.72	15.30	656	11	102.01	0.01	431
E0229	BULK	47.80	CORE	1.63	102.29	1.31	16.40	623	7	103.92	0.01	436
E0229	BULK	47.80	CORE	1.53	100.99	1.28	16.40	615	7	102.52	0.01	441
E5339	BULK	48.00	CORE	0.93	69.77	1.21	9.69	720	12	70.70	0.01	433
E5341	BULK	48.50	CORE	0.69	48.98	1.18	8.30	590	14	49.67	0.01	434
E0230	BULK	48.77	CORE	1.22	113.83	1.55	17.80	639	8	115.05	0.01	437
E0230	BULK	48.77	CORE	1.87	112.00	1.24	17.80	629	6	113.87	0.01	442
E5344	BULK	49.25	CORE	0.61	53.17	1.21	8.78	605	13	53.78	0.01	434
E5345	BULK	49.50	CORE	1.44	99.76	1.32	14.10	707	9	101.20	0.01	429
E0233	BULK	49.77	CORE	0.36	31.11	0.96	5.74	541	16	31.47	0.01	429
E0233	BULK	49.77	CORE	0.38	32.30	0.95	5.74	562	16	32.68	0.01	434
E5348	BULK	50.25	CORE	0.27	23.03	1.27	4.98	462	25	23.30	0.01	431
E5349	BULK	50.50	CORE	0.94	81.17	1.51	10.30	788	14	82.11	0.01	436
E0232	BULK	50.77	CORE	1.02	66.37	1.58	11.70	567	13	67.39	0.01	433
E0234	BULK	51.36	CORE	0.22	11.24	1.23	3.03	371	40	11.46	0.01	426
E0234	BULK	51.36	CORE	0.11	11.60	1.15	3.03	382	37	11.71	0.00	431
E5354	BULK	51.85	CORE	0.31	23.34	1.29	5.44	429	23	23.65	0.01	429
E0235	BULK	52.36	CORE	0.62	55.46	1.51	9.38	591	16	56.08	0.01	434
E5356	BULK	52.60	CORE	0.52	49.29	2.24	8.30	593	26	49.81	0.01	433
E5358	BULK	52.85	CORE	0.72	64.79	2.16	9.40	689	22	65.51	0.01	435
E5359	BULK	53.10	CORE	0.79	51.87	2.28	9.21	563	24	52.66	0.01	432
E0237	BULK	53.36	CORE	0.43	32.81	1.18	6.50	504	18	33.24	0.01	430
E5360	BULK	53.60	CORE	0.31	21.56	1.89	5.42	397	34	21.87	0.01	429
E5362	BULK	53.85	CORE	0.38	34.64	2.46	6.48	534	37	35.02	0.01	433
E0238	BULK	54.26	CORE	0.63	50.59	1.41	9.43	536	14	51.22	0.01	432

* Low S1 and/or S2. PI not reliable.

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6307/07-U-03A
Date : 88.10.28

Table 5.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E5364	BULK	54.50	CORE	0.90	52.20	1.65	10.70	487	15	53.10	0.01	428
E5367	BULK	55.00	CORE	0.53	41.72	1.39	8.20	508	16	42.25	0.01	428
E0239	BULK	55.26	CORE	0.24	22.45	1.26	5.56	403	22	22.69	0.01	424
E0239	BULK	55.26	CORE	0.27	23.39	1.23	5.56	420	22	23.66	0.01	428
E5368	BULK	55.50	CORE	0.25	19.89	1.67	4.96	401	33	20.14	0.01	427
E5370	BULK	55.75	CORE	0.29	18.68	2.24	6.04	309	37	18.97	0.01	420
E0240	BULK	56.26	CORE	0.18	20.22	1.26	5.37	376	23	20.40	0.00	428
E5374	BULK	56.75	CORE	0.23	15.37	1.99	5.23	293	38	15.60	0.01	423
E0241	BULK	57.36	CORE	0.10	11.21	1.88	3.98	281	47	11.31	0.00	427
E5378	BULK	57.85	CORE	0.29	14.39	0.92	5.91	243	15	14.68	0.01	424
E0244	BULK	58.36	CORE	0.09	8.73	2.41	3.29	265	73	8.82	0.01	425
E0246	BULK	58.65	CORE	0.18	17.55	0.72	5.17	339	13	17.73	0.01	428
E5382	BULK	58.85	CORE	0.22	15.91	0.74	5.86	271	12	16.13	0.01	428
E0247	BULK	59.36	CORE	0.13	13.57	1.04	5.25	258	19	13.70	0.00	424
E5386	BULK	59.85	CORE	0.24	24.62	1.71	6.25	393	27	24.86	0.00	429
E5388	BULK	60.35	CORE	0.17	12.00	1.53	4.17	287	36	12.17	0.01	427
E5389	BULK	60.60	CORE	0.35	27.40	1.96	7.41	369	26	27.75	0.01	425
E0249	BULK	60.83	CORE	0.11	9.76	0.90	3.80	256	23	9.87	0.01	430
E5393	BULK	61.35	CORE	0.05	1.71	3.72	1.34	127	277	1.76	0.02	428*
E0251	BULK	61.83	CORE	0.19	15.87	1.06	4.96	319	21	16.06	0.01	422
E5398	BULK	62.35	CORE	0.13	9.69	1.64	3.83	253	42	9.82	0.01	424
E5399	BULK	62.60	CORE	0.35	23.07	2.04	7.00	329	29	23.42	0.01	421
E0253	BULK	62.83	CORE	0.35	30.83	0.50	6.82	452	7	31.18	0.01	429
E5401	BULK	63.10	CORE	0.20	13.23	1.63	5.10	259	31	13.43	0.01	420
E0255	BULK	63.43	CORE	0.17	17.02	0.54	5.06	336	10	17.19	0.00	428
E5404	BULK	63.90	CORE	0.27	18.31	1.81	5.98	306	30	18.58	0.01	421
E0256	BULK	64.43	CORE	0.52	37.54	0.84	8.84	424	9	38.06	0.01	430
E5408	BULK	64.90	CORE	0.19	15.53	1.65	5.24	296	31	15.72	0.01	424
E0258	BULK	65.43	CORE	0.26	20.52	0.63	5.92	346	10	20.78	0.01	426
E5413	BULK	65.90	CORE	0.09	8.12	2.98	2.42	335	123	8.21	0.01	420*
E0259	BULK	66.53	CORE	0.21	20.63	0.81	6.29	327	12	20.84	0.01	426
E5418	BULK	67.00	CORE	0.15	16.05	0.99	6.49	247	15	16.20	0.00	426
E0260	BULK	67.53	CORE	0.21	20.92	0.81	5.67	368	14	21.13	0.00	428
E5422	BULK	68.00	CORE	0.16	12.97	1.27	4.59	282	27	13.13	0.01	424
E0262	BULK	68.53	CORE	0.19	14.99	0.88	4.34	345	20	15.18	0.01	431
E5426	BULK	69.00	CORE	0.47	48.78	1.71	8.82	553	19	49.25	0.00	434
E0263	BULK	69.52	CORE	0.20	19.14	0.71	5.30	361	13	19.34	0.01	430
E5430	BULK	70.00	CORE	0.42	31.02	1.69	7.88	393	21	31.44	0.01	427
E5434	BULK	70.40	CORE	0.11	9.29	3.94	2.61	355	150	9.40	0.01	427
E0265	BULK	70.52	CORE	0.37	41.05	0.62	8.29	495	7	41.42	0.00	435
E5436	BULK	70.75	CORE	0.29	24.54	1.08	6.40	383	16	24.83	0.01	428
E5438	BULK	71.00	CORE	0.61	55.25	1.84	7.99	691	23	55.86	0.01	430
E5440	BULK	71.25	CORE	1.14	70.55	1.97	11.60	608	16	71.69	0.01	430
E0266	BULK	71.52	CORE	0.95	46.67	0.78	10.40	448	7	47.62	0.01	426
E5441	BULK	71.75	CORE	0.69	51.30	1.45	8.99	570	16	51.99	0.01	431

* Low S1 and/or S2. PI not reliable.

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6307/07-U-03A
Date : 88.10.28

Table 5.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH	SAMPLE TYPE	S1	S2	S3	TOC	HYDR. INDEX	OXYG. INDEX	PETR. POTEN.	PROD. INDEX S1/(S1+S2)	Tmax
		(m)		(mg/g rock)			(%)	(mg/g TOC)		S1+S2		(°C)
E5442	BULK	72.00	CORE	1.05	68.65	1.90	9.92	692	19	69.70	0.01	430
E0267	BULK	72.55	CORE	0.24	17.59	2.57	8.66	203	29	17.83	0.01	419
E5447	BULK	73.00	CORE	0.36	18.33	1.82	5.45	336	33	18.69	0.01	420
E5450	BULK	73.50	CORE	0.24	15.37	1.70	5.93	259	28	15.61	0.01	426
E0268	BULK	73.80	CORE	0.26	28.26	0.77	6.78	416	11	28.52	0.00	429
E0270	BULK	74.45	CORE	0.33	24.46	0.69	6.20	394	11	24.79	0.01	428
E5454	BULK	75.00	CORE	0.34	20.97	1.85	7.31	286	25	21.31	0.01	425
E0271	BULK	75.30	CORE	0.10	13.19	0.97	4.79	275	20	13.29	0.00	430*
E5457	BULK	75.85	CORE	0.29	22.60	2.25	6.62	341	33	22.89	0.01	422
E5459	BULK	76.35	CORE	0.60	45.85	2.06	8.24	556	25	46.45	0.01	427
E0272	BULK	76.68	CORE	0.51	47.38	1.01	9.14	518	11	47.89	0.01	430
E5462	BULK	76.85	CORE	0.29	24.21	1.85	7.31	331	25	24.50	0.01	428
E5463	BULK	77.10	CORE	0.26	10.62	0.70	5.56	191	12	10.88	0.02	427
E5464	BULK	77.35	CORE	0.49	29.48	1.13	9.30	316	12	29.97	0.01	428
E0273	BULK	77.67	CORE	0.22	16.35	0.78	6.18	264	12	16.57	0.01	429
E5467	BULK	78.10	CORE	0.26	15.55	1.29	6.53	238	19	15.81	0.01	424
E5469	BULK	78.60	CORE	0.17	12.62	1.73	5.96	211	29	12.79	0.01	423
E0278	BULK	78.92	CORE	0.42	57.39	1.13	8.65	663	13	57.81	0.00	434
E5471	BULK	79.40	CORE	0.40	35.26	2.24	11.80	298	18	35.66	0.01	428
E0280	BULK	79.91	CORE	0.29	29.26	0.89	9.43	310	9	29.55	0.00	434
E5474	BULK	80.10	CORE	0.12	9.61	1.73	5.66	169	30	9.73	0.01	426

* Low S1 and/or S2. PI not reliable.

Location : 6307/07-U-03

DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH	SAMPLE TYPE	S1	S2	S3	TOC	HYDR. INDEX	OXYG. INDEX	PETR. POTEN.	PROD. INDEX S1/(S1+S2)	Tmax
		(m)		(mg/g rock)			(%)	(mg/g TOC)		S1+S2		(°C)
E0106	SLTST	9.63	CORE	0.01	0.17	0.28	0.54	31	51	0.18	0.05	426**
E0106	SST	9.63	CORE	0.00	0.00	0.26	0.15	0	173	0.00	0.00	303**
E0125		12.85	CORE	0.01	0.01	0.29	0.16	6	181	0.02	0.50	275**

** Tmax not reliable due to ill-defined or very low S2-peak.

Project no.: 21343424
Location : 6307/07-U-03A
Date : 88.10.28

IKU SINTEF-GRUPPEN

Table III.5.5a WEIGHT OF CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ROCK EXTR. (g)	EOM (mg)	ASPH (mg)	SAT HC (mg)	ARO HC (mg)	POLAR COMP. (mg)	HC (mg)	NONHC (mg)	TOC (%)
E0193	EOM	30.86	CORE	68.5	87.4	34.2	5.7	9.2	35.8	14.9	72.5	4.40
E0214	EOM	37.34	CORE	75.6	50.2	27.2	2.3	4.8	12.6	7.1	43.1	2.61
E0227	EOM	46.20	CORE	77.0	174.4	69.0	18.3	19.0	50.7	37.3	137.1	7.21
E0230	EOM*	48.77	CORE	76.3	373.4	101.4	29.7	31.0	91.3	60.7	312.7	11.60
E0232	EOM	50.77	CORE	75.6	284.1	125.0	27.6	31.5	69.3	59.1	225.0	9.20
E0234	EOM	51.36	CORE	80.8	104.8	48.6	6.5	11.4	29.9	17.9	86.9	3.36
E0235	EOM*	52.36	CORE	83.1	307.4	73.3	34.6	25.4	96.8	60.0	247.4	10.30
E0239	EOM	55.26	CORE	83.1	158.8	123.4	9.4	14.3	31.9	23.7	135.1	5.42
E0240	EOM	56.26	CORE	71.2	136.2	71.3	7.2	18.4	35.0	25.6	110.6	5.64
E0249	EOM	60.83	CORE	85.0	259.4	118.3	28.7	22.1	75.3	50.8	208.6	7.69
E0253	EOM	62.83	CORE	78.6	207.9	102.8	14.1	22.2	54.0	36.3	171.6	8.07
E0265	EOM*	70.52	CORE	77.0	291.9	75.4	26.5	20.7	64.0	47.2	244.7	9.82
E0266	EOM*	71.52	CORE	74.0	336.8	110.1	16.7	39.5	79.4	56.2	280.6	9.41
E0280	EOM	79.91	CORE	77.4	161.8	80.6	11.9	10.9	38.0	22.8	139.0	7.40

* EOM was filtered before asphaltene precipitation because of a relatively high content of humic-like compounds.

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Table III.5.5b CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm of rock)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0193	EOM	30.86	CORE	1277	500	84	135	523	219	1058
E0214	EOM	37.34	CORE	664	360	31	63	167	94	570
E0227	EOM	46.20	CORE	2265	896	238	246	658	484	1781
E0230	EOM	48.77	CORE	4894	1329	389	406	1196	795	4099
E0232	EOM	50.77	CORE	3758	1653	366	417	916	783	2975
E0234	EOM	51.36	CORE	1297	602	81	141	370	222	1075
E0235	EOM	52.36	CORE	3698	882	417	305	1165	722	2976
E0239	EOM	55.26	CORE	1912	1486	113	172	384	285	1627
E0240	EOM	56.26	CORE	1912	1001	101	258	492	359	1553
E0249	EOM	60.83	CORE	3051	1392	337	260	886	597	2454
E0253	EOM	62.83	CORE	2644	1307	179	282	687	461	2183
E0265	EOM	70.52	CORE	3789	979	343	268	831	611	3178
E0266	EOM	71.52	CORE	4550	1487	226	533	1072	759	3791
E0280	EOM	79.91	CORE	2090	1041	154	141	491	295	1795

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Table III.5.5c CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0193	EOM	30.86	CORE	29.0	11.4	1.9	3.1	11.9	5.0	24.0
E0214	EOM	37.34	CORE	25.4	13.8	1.2	2.4	6.4	3.6	21.8
E0227	EOM	46.20	CORE	31.4	12.4	3.3	3.4	9.1	6.7	24.7
E0230	EOM	48.77	CORE	42.2	11.5	3.4	3.5	10.3	6.9	35.3
E0232	EOM	50.77	CORE	40.8	18.0	4.0	4.5	10.0	8.5	32.3
E0234	EOM	51.36	CORE	38.6	17.9	2.4	4.2	11.0	6.6	32.0
E0235	EOM	52.36	CORE	35.9	8.6	4.0	3.0	11.3	7.0	28.9
E0239	EOM	55.26	CORE	35.3	27.4	2.1	3.2	7.1	5.3	30.0
E0240	EOM	56.26	CORE	33.9	17.7	1.8	4.6	8.7	6.4	27.5
E0249	EOM	60.83	CORE	39.7	18.1	4.4	3.4	11.5	7.8	31.9
E0253	EOM	62.83	CORE	32.8	16.2	2.2	3.5	8.5	5.7	27.1
E0265	EOM	70.52	CORE	38.6	10.0	3.5	2.7	8.5	6.2	32.4
E0266	EOM	71.52	CORE	48.4	15.8	2.4	5.7	11.4	8.1	40.3
E0280	EOM	79.91	CORE	28.2	14.1	2.1	1.9	6.6	4.0	24.2

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Table III.5.5d COMPOSITION OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ASPH EOM (%)	SAT EOM (%)	ARO EOM (%)	HC EOM (%)	POLAR EOM (%)	SAT ARO x 100	HC NONHC x 100
E0193	EOM	30.86	CORE	39.1	6.6	10.6	17.2	41.0	62.2	20.7
E0214	EOM	37.34	CORE	54.2	4.6	9.5	14.1	25.1	48.7	16.5
E0227	EOM	46.20	CORE	39.6	10.5	10.9	21.4	29.1	96.5	27.2
E0230	EOM	48.77	CORE	27.2	8.0	8.3	16.3	24.4	95.8	19.4
E0232	EOM	50.77	CORE	44.0	9.7	11.1	20.8	24.4	87.6	26.3
E0234	EOM	51.36	CORE	46.4	6.2	10.9	17.1	28.5	57.1	20.7
E0235	EOM	52.36	CORE	23.8	11.3	8.3	19.6	31.5	136.6	24.3
E0239	EOM	55.26	CORE	77.7	5.9	9.0	14.9	20.1	65.9	17.5
E0240	EOM	56.26	CORE	52.3	5.3	13.5	18.8	25.7	39.3	23.2
E0249	EOM	60.83	CORE	45.6	11.1	8.5	19.6	29.0	129.6	24.3
E0253	EOM	62.83	CORE	49.4	6.8	10.7	17.5	26.0	63.5	21.1
E0265	EOM	70.52	CORE	25.8	9.1	7.1	16.2	21.9	128.0	19.2
E0266	EOM	71.52	CORE	32.7	5.0	11.7	16.7	23.6	42.4	20.0
E0280	EOM	79.91	CORE	49.8	7.4	6.8	14.2	23.5	109.2	16.5

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Project no.: 21343432
Location : 6307/07-U-03A
Date : 88.10.26

Table III.5.6a TABULATION OF DATA FROM GAS CHROMATOGRAMS OF TOTAL SATURATES AND N-ALKANES

IKUNO	FRAC NAME	DEPTH (m)	Pri* / Phy	Pri* A= / n-C17	Phy* B= / n-C18	A* / B	n-C17 / n-C27	n-C31 / n-C19	CPI 1	CPI 2
E0193	SAT	30.86	1.5	1.5	1.2	1.3	0.4	1.0	1.9	1.9
E0214	SAT	37.34	3.0	1.0	0.4	2.3	0.6	0.9	2.0	2.0
E0227	SAT	46.20	1.6	0.9	0.9	1.0	0.6	1.3	2.0	2.2
E0230	SAT	48.77	1.5	0.6	0.4	1.3	0.4	1.4	1.7	2.0
E0232	SAT	50.77	1.5	1.0	0.7	1.5	0.4	1.1	2.2	2.3
E0234	SAT	51.36	2.1	1.0	0.5	1.8	0.5	1.2	2.1	2.1
E0235	SAT	52.36	1.1	0.7	0.7	1.0	0.5	0.8	2.0	2.2
E0239	SAT	55.26	1.4	0.7	0.6	1.1	0.7	0.9	1.9	2.0
E0240	SAT	56.26	2.2	0.6	0.4	1.6	0.7	0.8	1.8	1.9
E0253	SAT	62.83	1.8	0.4	0.3	1.4	0.5	1.4	1.7	1.6
E0265	SAT	70.52	1.3	0.4	0.4	1.0	0.5	1.2	1.7	1.7
E0266	SAT	71.52	1.6	0.5	0.5	1.1	0.6	1.5	2.1	2.3
E0280	SAT	79.91	2.0	0.5	0.2	2.0	0.6	0.7	1.8	1.9

* Ratios calculated from peak areas.

Table III.5.6b TABULATION OF DATA FROM GAS CHROMATOGRAMS OF TOTAL SATURATES
Peak heights.

IKUNO	FRAC NAME	DEPTH (m)	Pri / Phy	Pri A= / n-C17	Phy B= / n-C18	A / B
E0193	SAT	30.86	1.6	1.4	1.0	1.4
E0214	SAT	37.34	3.2	0.9	0.4	2.3
E0227	SAT	46.20	1.6	1.0	0.8	1.3
E0230	SAT	48.77	1.5	0.6	0.4	1.5
E0232	SAT	50.77	1.5	0.9	0.6	1.5
E0234	SAT	51.36	2.1	0.9	0.5	1.8
E0235	SAT	52.36	1.1	0.6	0.7	0.9
E0239	SAT	55.26	1.5	0.7	0.6	1.2
E0240	SAT	56.26	2.2	0.6	0.4	1.5
E0253	SAT	62.83	2.0	0.5	0.3	1.7
E0265	SAT	70.52	1.5	0.4	0.3	1.3
E0266	SAT	71.52	1.7	0.5	0.4	1.3
E0280	SAT	79.91	2.1	0.5	0.2	2.5

Table III.5.7a *Molecular ratios from peak heights in mass chromatograms. Hopenes/hopanes m/z 191. Branched/cycloalkane fractions in extracts. Core 6307/07-U-03A*

Sample no.	Depth (m)	C_{27}-17β/17α[1]	C_{27}-18α/17α[2] (Tm/Ts)	αβ/αβ+ββ[3]	ββ/αβ+ββ[4]	$C_{30:1}/C_{30}$-αβ[5]	tri/C_{27}-17β[6]	C_{27}-17β/C_{30}-ββ/		C_{31}-ββ[7]
E-214	37.34	1.35	-	40.9	59.1	0.71	0.22	27.4	47.7	24.9
E-227	46.20	1.23	0.77	45.2	54.8	0.57	0.67	32.8	48.0	19.2
E-230	48.77	1.50	0.88	46.2	53.8	0.87	0.56	28.6	50.0	21.4
E-235	52.36	1.44	0.50	50.0	50.0	0.63	0.12	29.3	44.9	25.7
E-239	55.26	1.60	0.48	44.8	55.2	1.28	0.18	31.8	42.1	26.2
E-249	60.83	1.32	0.57	47.4	52.6	1.08	0.16	25.3	47.9	26.7
E-253	62.83	1.43	0.43	45.6	54.4	0.71	0.14	21.9	47.4	30.6
E-265	70.52	1.42	0.35	56.7	43.3	0.81	0.11	35.6	43.3	21.2

1 Peak 4/3
2 Peak 2/3
3 Peak 8/8+12 (in %), C_{30}-isomers
4 Peak 12/8+12 (in %)
5 Peak 9/8
6 Peak 3 in total m/z 191/peak 4 in hopane range m/z 191
7 % distribution of peaks 4/12/13

IKU SINTEF-GRUPPEN

Table III.5.7b *Molecular ratios from peak heights in mass chromatograms. Sterenes/steranes m/z 217, 257. Branched/cycloalkane fractions in extracts. Core 6307/07-U-03A*

Sample no.	Depth (m)	C_{29}-sterane isomers[1]	$\%C_{27}$	C_{28}	C_{29}[2]	Rearr.sterenes/steranes[3]	Rearr. sterenesII/steranes[4]	C_{21}/C_{29}[5]
E-214	37.34	23.1	33.9	16.1	50.0	7.0	5.7	0.68
E-227	46.20	27.1	42.5	26.5	31.0	5.8	3.0	0.51
E-230	48.77	19.2	43.7	23.2	33.2	4.1	4.5	0.38
E-235	52.36	24.1	40.4	20.2	39.5	2.5	1.9	0.13
E-239	55.26	19.8	50.0	13.9	36.1	4.8	3.5	0.38
E-249	60.83	13.3	48.0	15.3	36.7	6.4	14.6	0.23
E-253	62.83	20.4	44.3	17.2	38.4	4.9	3.3	0.26
E-265	70.52	25.9	47.8	19.2	33.0	3.3	4.9	0.25

9/9+10

1 Peak ~~6/6+7~~, $\%(\beta\alpha\alpha/\beta\alpha\alpha+\alpha\alpha\alpha)$
2 % distribution of peaks 3/5/7
3 Intensity in m/z 257/m/z 217
4 Intensity in m/z 271/m/z 217
5 Peaks 2/9+10 in m/z 217

IKU SINTEF-GRUPPEN

Table III.5.8a *Molecular ratios from PY-GC-MS chromatograms of kerogens. Branched compounds and aromatics. All ratios are calculated from peak heights.*

	Depth (m)	HI	$\frac{C_{11}-C_{17}\ alkene}{alkane}$ [1]	$\frac{1\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{(1+2)\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{alkadiene}{n\text{-decene}}$ [2]
Core 6307/07-U-03A						
E-193	30.86	300	1.41	0.48	0.79	0.13
E-227	46.20	558	1.18	0.52	0.72	0.16
E-230	48.77	639	1.25	0.23	0.32	0.17
E-239	55.20	404	1.47	0.15	0.44	~0
E-249	60.83	256	1.10	0.21	0.49	~0
E-253	62.83	452	1.35	0.13	0.23	0.24
E-265	70.52	495	1.59	0.10	0.18	0.24

1) Measured from the total ion chromatograms (TICs)

2) Alkadienes from m/z 95, n-decene from m/z 97. $nC_{12}+nC_{15}+nC_{17}$ alkadienes are used here.

IKU SINTEF-GRUPPEN

Table III.5.8a cont.

	Depth (m)	HI	(m+p)-xylene [1] / n-decene	o-xylene [1] / n-decene	$\Sigma C_i B$ (i=15 to 20) [2] / $C_{15}B$	(1+2) MN [3] / n-heptadecane	MP [4] / n-decene	MDBT [5] / n-tetradecane
Core 6307/07-U-03A								
E-193	30.86	300	3.5	3.0	0.56	12.3	0.24	0.35
E-227	46.20	558	1.6	0.8	0.57	3.0	0.04	0.00
E-230	48.77	639	1.4	0.8	1.29	3.5	0.07	0.15
E-239	55.20	404	2.0	2.4	0.67	8.8	0.24	0.28
E-249	60.83	256	2.2	1.0	1.34	4.3	0.35	0.15
E-253	62.83	452	1.7	1.0	0.95	5.9	0.20	0.24
E-265	70.52	495	1.7	1.2	0.98	4.1	0.10	0.13

1) Xylenes from m/z 106, n-decene from m/z 97.

2) Alkylbenzenes from m/z 105. The most intense isomers is used for each C-number.

3) Methylnaphthalenes (MN) and n-heptadecane from m/z 141.

4) Methylphenanthrenes from m/z 192, n-decene from m/z 97. The sum of 3-MP, 2-MP, 9-MP and 1-MP is used.

5) Methyldibenzothiophenes (MDBT) from m/z 198, n-decene from m/z 97.

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Table III.5.8a cont.

IKU no.	Depth (m)	HI	(m+p)-xylene / n-decene	o-xylene / n-decene	phenol / n-decene	meth.phenol / n-decene	2-meth.phenol / 1-meth.phenol
Core 6307/07-U-03A							
E-193	30.86	300	3.7	2.7	9.1	10.0	0.43
E-227	46.20	558	1.9	1.0	4.1	3.6	0.43
E-230	48.77	639	1.2	0.8	1.8	2.5	0.51
E-239	55.20	404	3.4	2.5	11.1	9.6	0.51
E-249	60.83	256	2.3	1.1	7.2	7.9	0.47
E-253	62.83	452	2.1	1.3	4.1	5.6	0.48
E-265	70.52	495	1.9	1.3	4.7	4.8	0.47

Xylenes from m/z 106, n-decene from m/z 97, phenol from m/z 94, methylphenols from m/z 108.

SDMT/rapport/AE2/21.3434.28/ame/3/28-DEC-88

Table III.5.8b *Molecular ratios from triterpane mass chromatograms (m/z 191). Calculated from peak areas (E-619 from measured peak heights). PY-GC/MS of kerogen.*
Well 6307/07-U-03A

Sample no.	Depth (m)	C_{27}-17β/17α[1]	C_{27}-18α/17α[2]	$C_{27:1}/C_{27:0}$-17β[3]	$C_{29:1}/C_{29:0}$[4]	% distribution[5] $C_{27:0}$-17β	$C_{29:0}$	$C_{30:0}$
E-193	30.80	1.8	0.65	1.7	1.9	40.9	33.6	25.5
E-227	46.20	1.1	0.76	0.9	1.2	28.7	32.8	38.4
E-230	48.77	1.5	0.64	1.5	1.4	31.3	34.5	34.5
E-239	55.26	2.1	0.95	0.1	1.4	45.3	33.9	20.8
E-249	60.83	1.6	0.71	0.3	1.4	39.3	40.5	20.2
E-253	62.83	1.6	0.73	0.8	2.0	39.4	27.3	33.2
E-265	70.52	1.9	0.64	1.4	1.3	31.9	37.0	31.2

1) Peaks 4/3
2) Peaks 2/3
3) Peaks 3a/4
4) Peaks 5/7
5) % distribution of peaks 4, 7 and 10

IKU SINTEF-GRUPPEN

Well number: 6307/07-U-03A
Reference number:21.3434.24

Table III.5.9 HUMINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	REL RAT	STANDARD DEVIATION	FLUORESCENCE
E-167	------	22.10	0.34 (20)	G	0.05	1?
E-276	------	78.17	0.27 (12)	F	0.06	1-2
			0.55 (2)	R	0.07	

REL RAT (Reliability Rating): G = Good; F = Fair; P = Poor; LRV = Low Reflecting Vitrinite; HRV = High Reflecting Vitrinite; LRM = Low Reflecting Material; I = Inertinite.

VISUAL KEROGEN ANALYSIS

TABLE NO.: III.5.10
WELL NO.: 6307/07-U-03A

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
E-227	46.20m	Am:90-95% Lm:<5% W :<5% C :<5%	F-M-L	Fair	NEWTAI 2.0-3.0	Organic residue totally dominated by amorphous matter, both finely dispersed and larger aggregates/degraded clasts. In UV-light about 40% of the amorphous matter show strong yellow fluorescence. The amorphous matter is frequently specked with pyrite and small dark woody/coaly fragments.
E-230	48.77m	Am:90-95% Lm:<5% W :<5% C :<5%	F-M-L	Fair	--"--	Comparable to sample E-227

ABBREVIATIONS:

Am = Amorphous
Al = Algae
W = Woody material
C = Coaly fragments
Lm = Liptinitic material

F = Fine
M = Medium
L = Large

* see experimental

IKU SINTEF-GRUPPEN

VISUAL KEROGEN ANALYSIS

TABLE NO.: III.5.10
WELL NO.: 6307/07-U-03A

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
E-235	52.36m	Am:80-85% Lm:5-10% W :<5% C :<5%	F-M-L	Fair	2.0-3.0	Comparable to sample E-227, but with a decreased proportion of organic matter showing strong yellow fluorescence (25%) and with a slightly increased fraction of liptinitic material.
E-239	55.26m	Am:80-85% Lm:5% W :5-10% C :5-10%	F-M-L	Good-Fair	2.0-3.0	Organic residue dominated by amorphous matter. Only about 5-10% shows strong yellow fluorescence, whereas 30-35% shows (pale) brown-red fluorescence. Most of the amorphous matter is probably of liptinitic/algal origin.

ABBREVIATIONS:

Am = Amorphous
Al = Algae
W = Woody material
C = Coaly fragments
Lm = Liptinitic material

F = Fine
M = Medium
L = Large

* see experimental

IKU SINTEF-GRUPPEN

VISUAL KEROGEN ANALYSIS

TABLE NO.: III.5.10
WELL NO.: 6307/07-U-03A

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
E-249	60.83m	Am:80-85% Lm:5% W :5-10% C :5-10%	F-M-L	Good-Fair	2.0-3.0	Comparable to sample E-239, but with less amorphous matter of liptinitic/algal origin.
E-253	62.83m	Am:80-85% Lm:5% W :5-10% C :5-10%	F-M-L	Good-Fair	2.0-3.0	Comparable to sample E-239. Fresh-water algae (Botryococcus) present.
E-265	70.52m	Am:80-85% Lm:5% W :5-10% C :5-10%	F-M-L	Good-Fair	2.0-3.0	As per sample E-253.

ABBREVIATIONS:

Am = Amorphous
Al = Algae
W = Woody material
C = Coaly fragments
Lm = Liptinitic material

F = Fine
M = Medium
L = Large

* see experimental

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Table III.5.11 *Core 6307/07-U-03A. Isotope analyses of kerogens. $\delta^{13}C$ and δD*

IKU no.	Depth	$\delta^{13}C$ (o/oo PDB)	δD (o/oo SMOW)
E-214	37.34	-25.8	-137
E-227	46.20	-26.3	
E-230	48.77	-28.6	-123
E-235	52.36	-28.8	-109
E-239	55.26	-26.2	
E-249	60.83	-26.8	
E-253	62.83	-27.9	
E-265	70.52	-29.4	-132

FIGURES

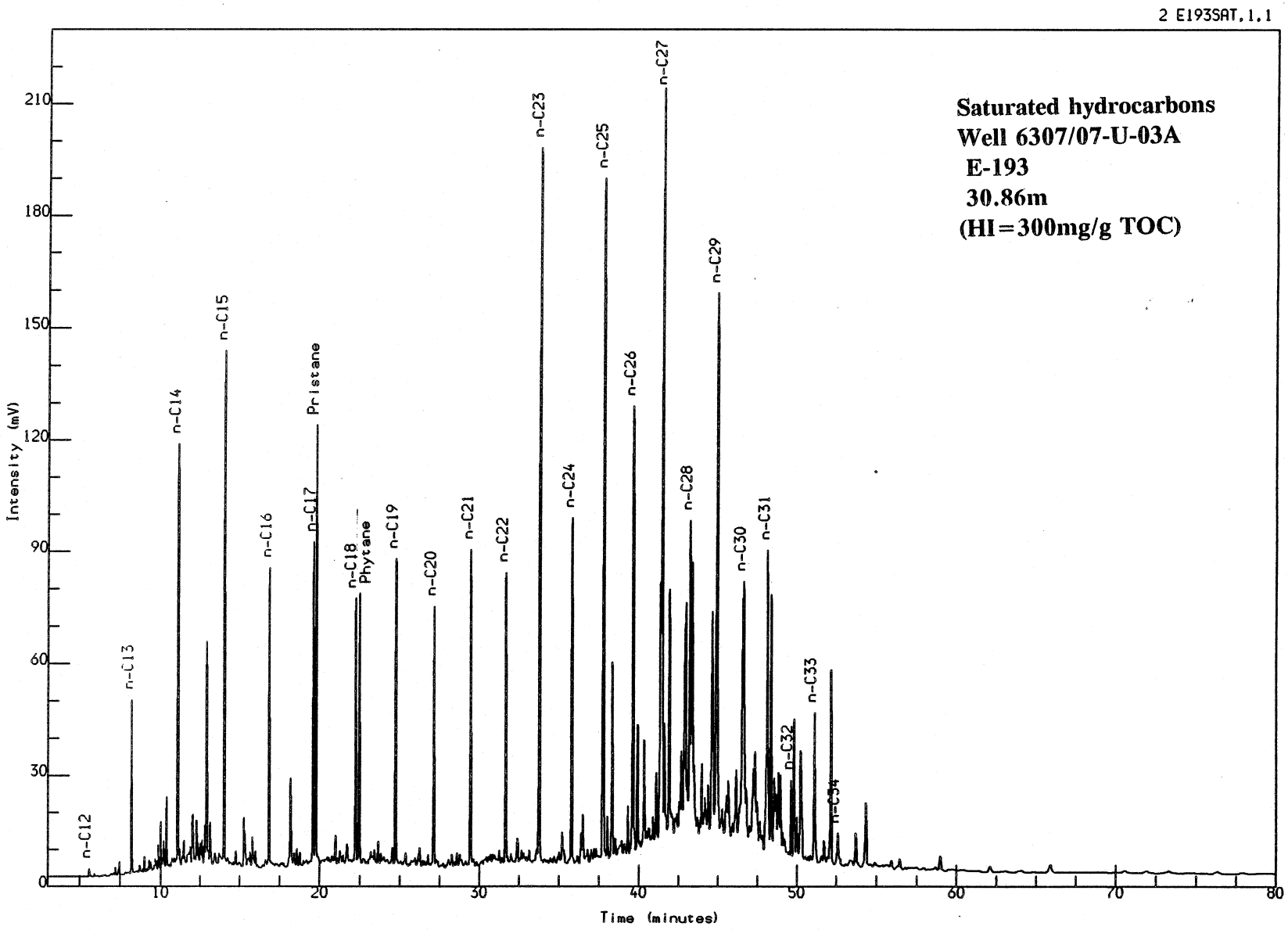
IKU SINTEF-GRUPPEN

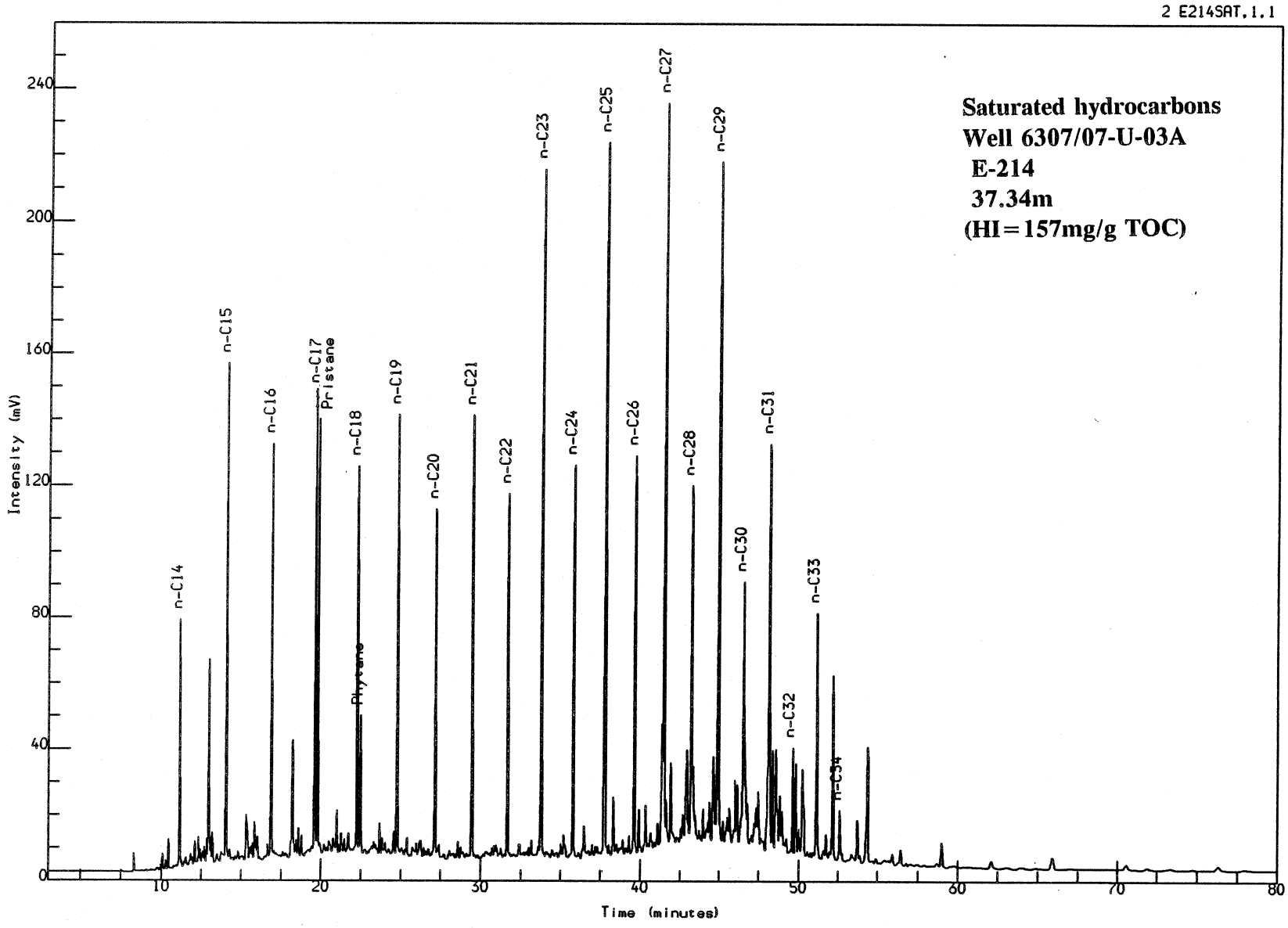
Figure III.5.1

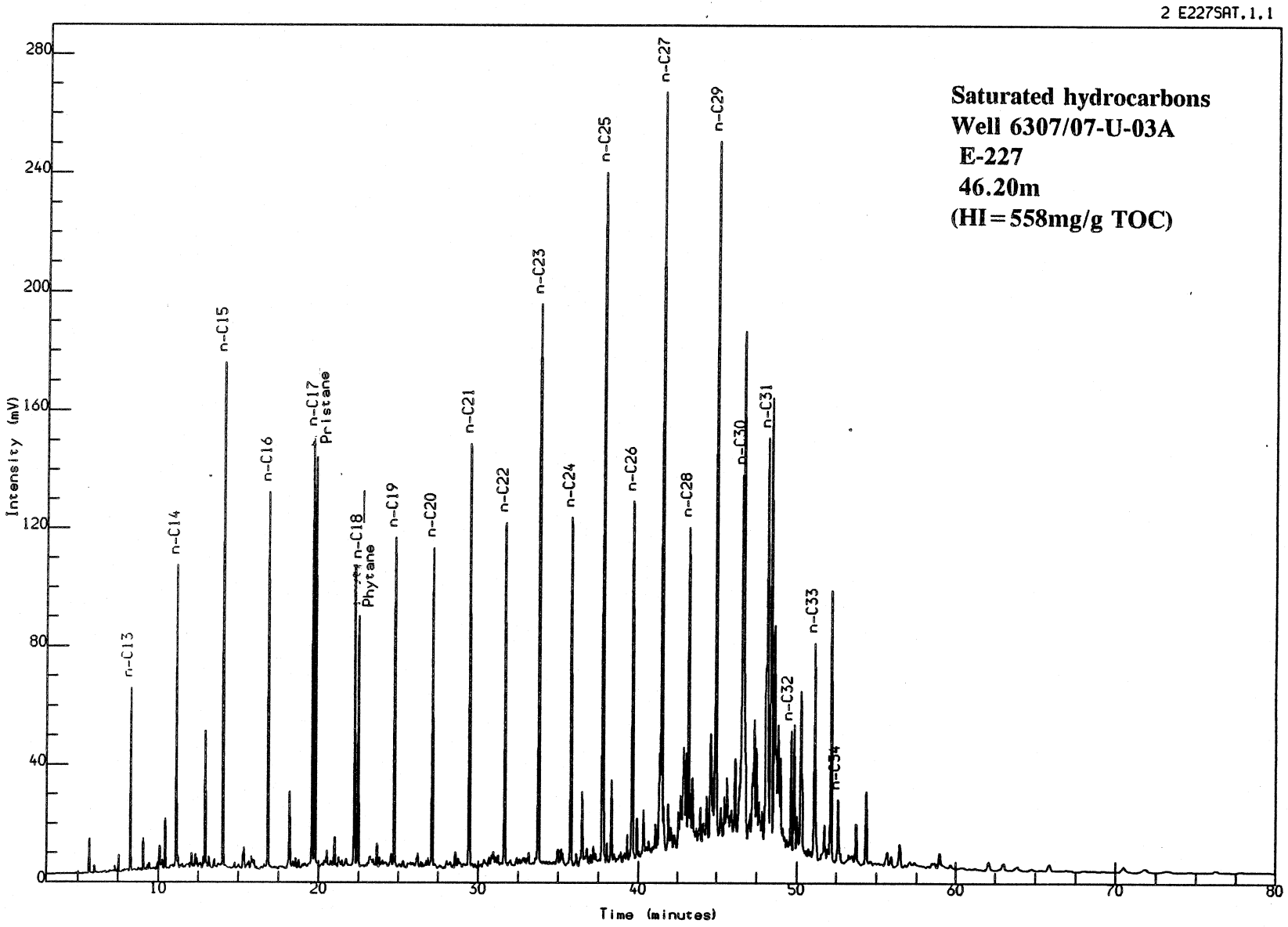
Gas chromatograms

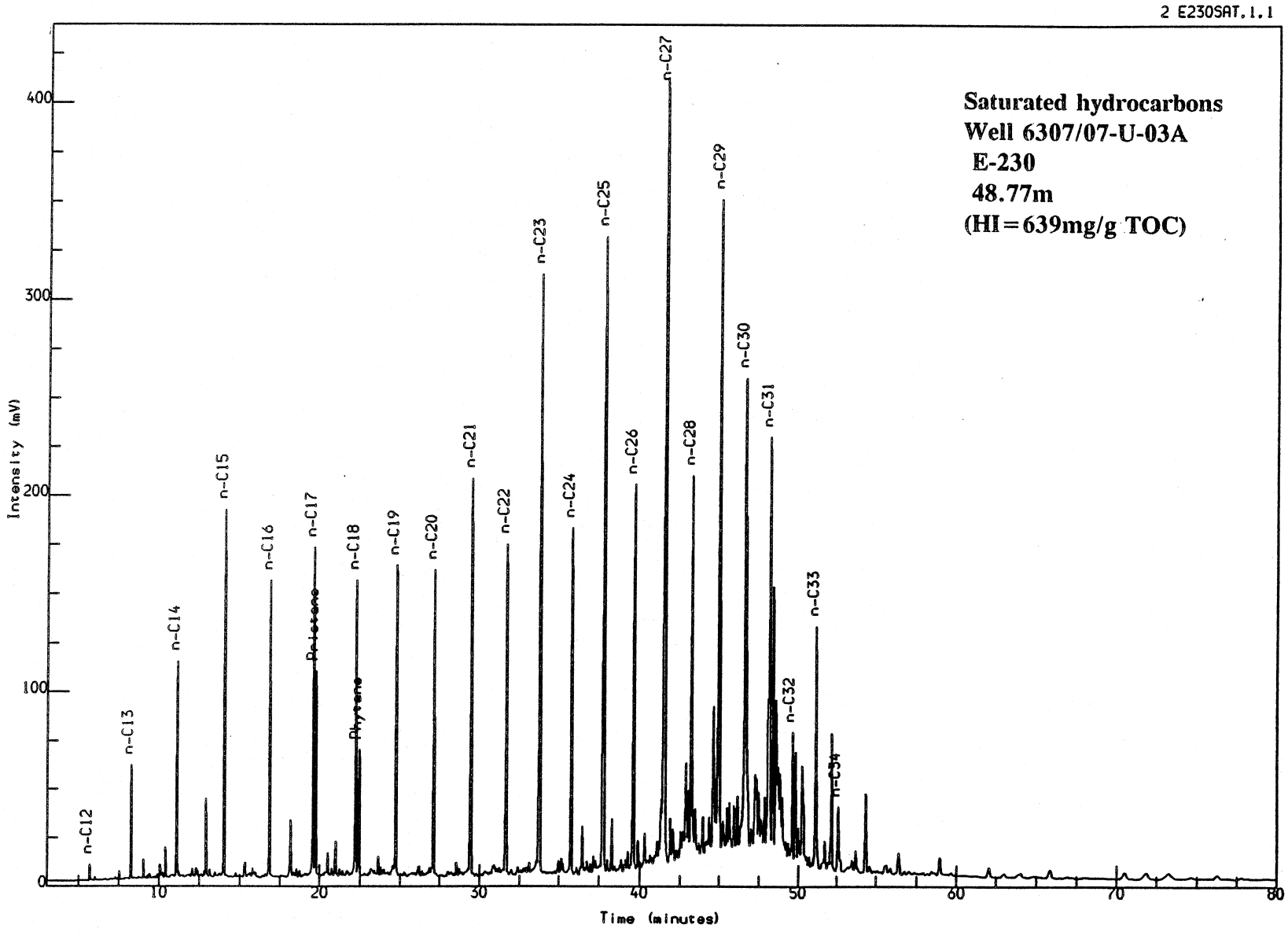
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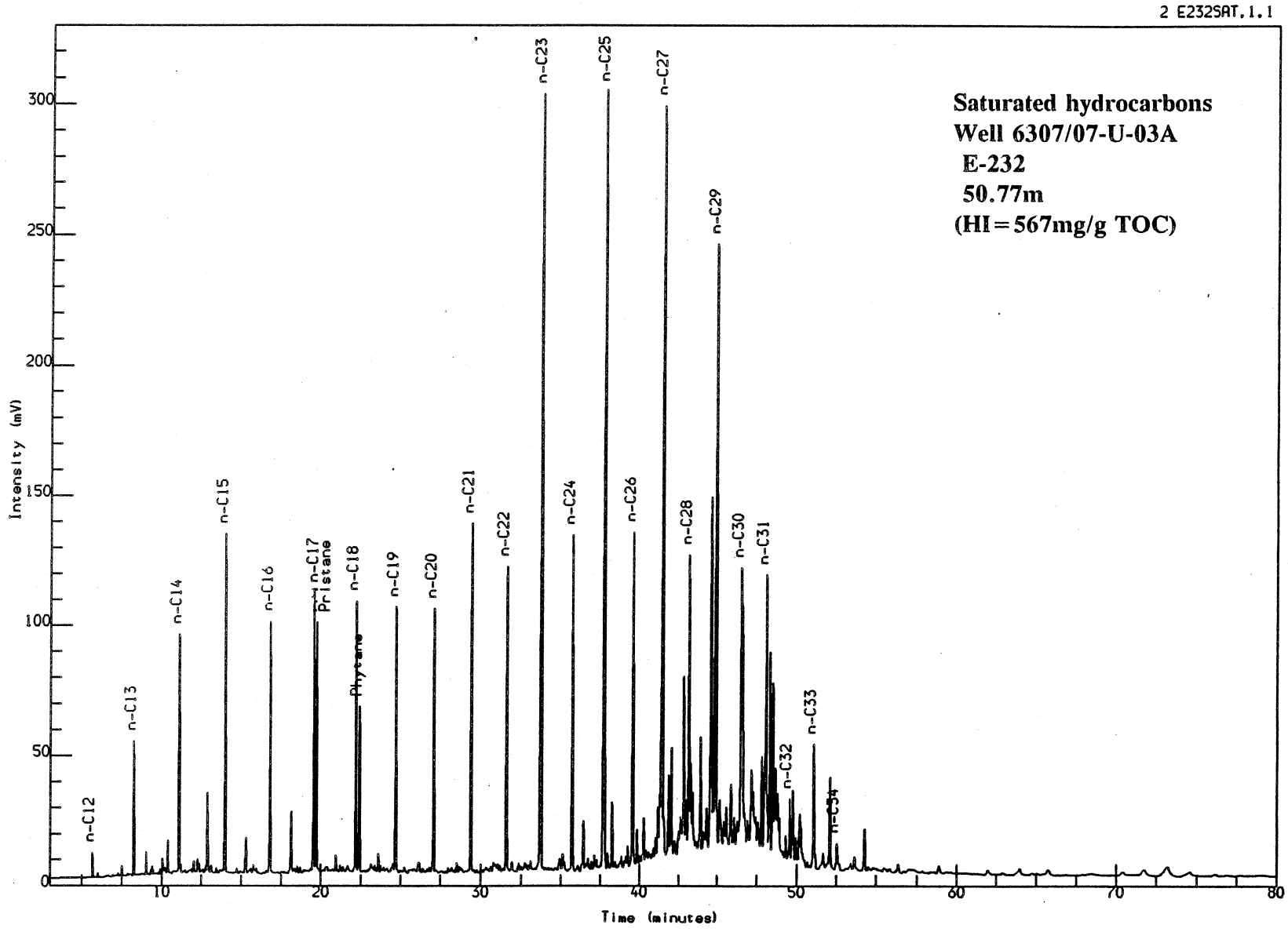
total saturated hydrocarbons

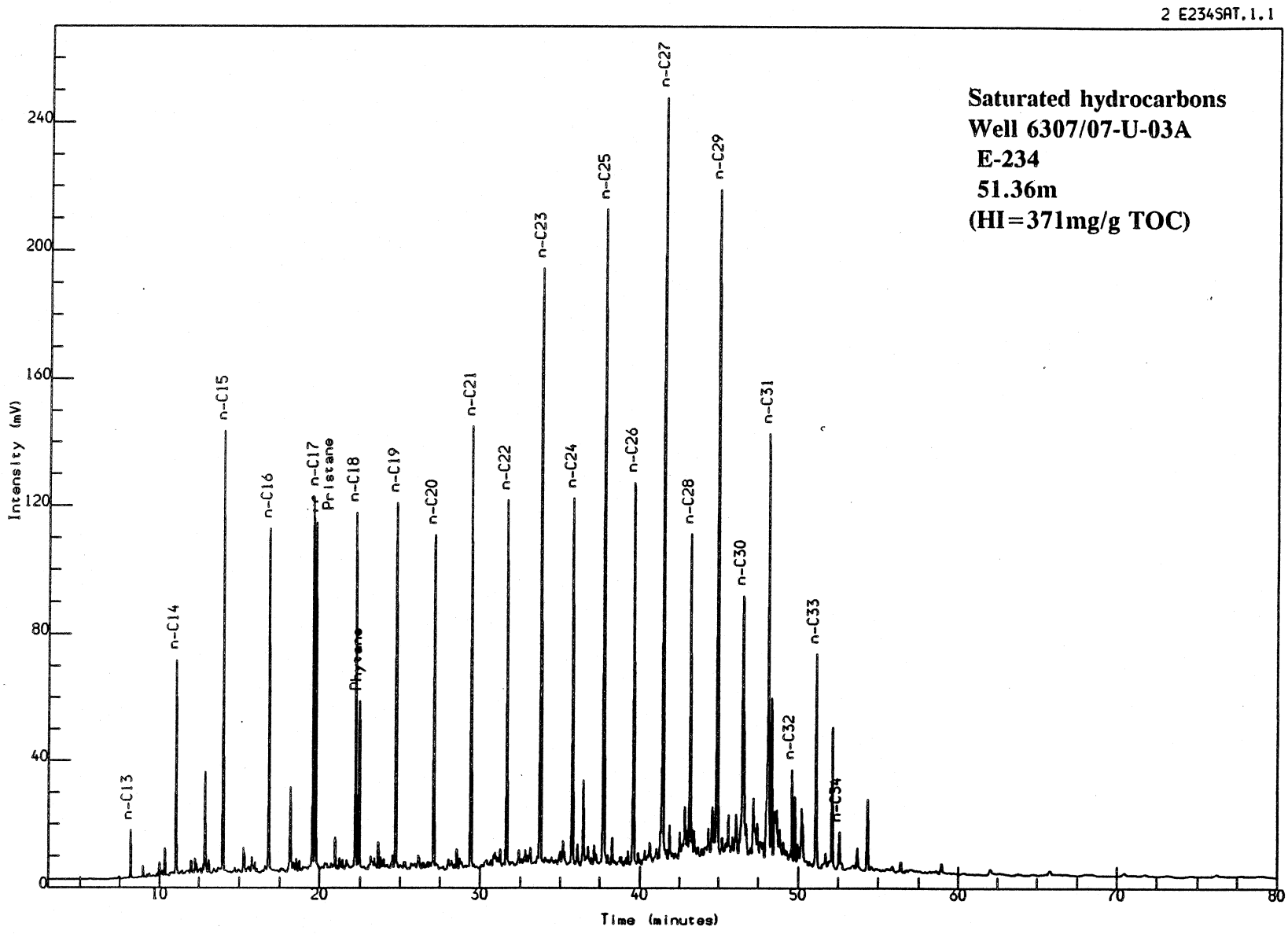

2 E193SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-193
30.86m
(HI=300mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

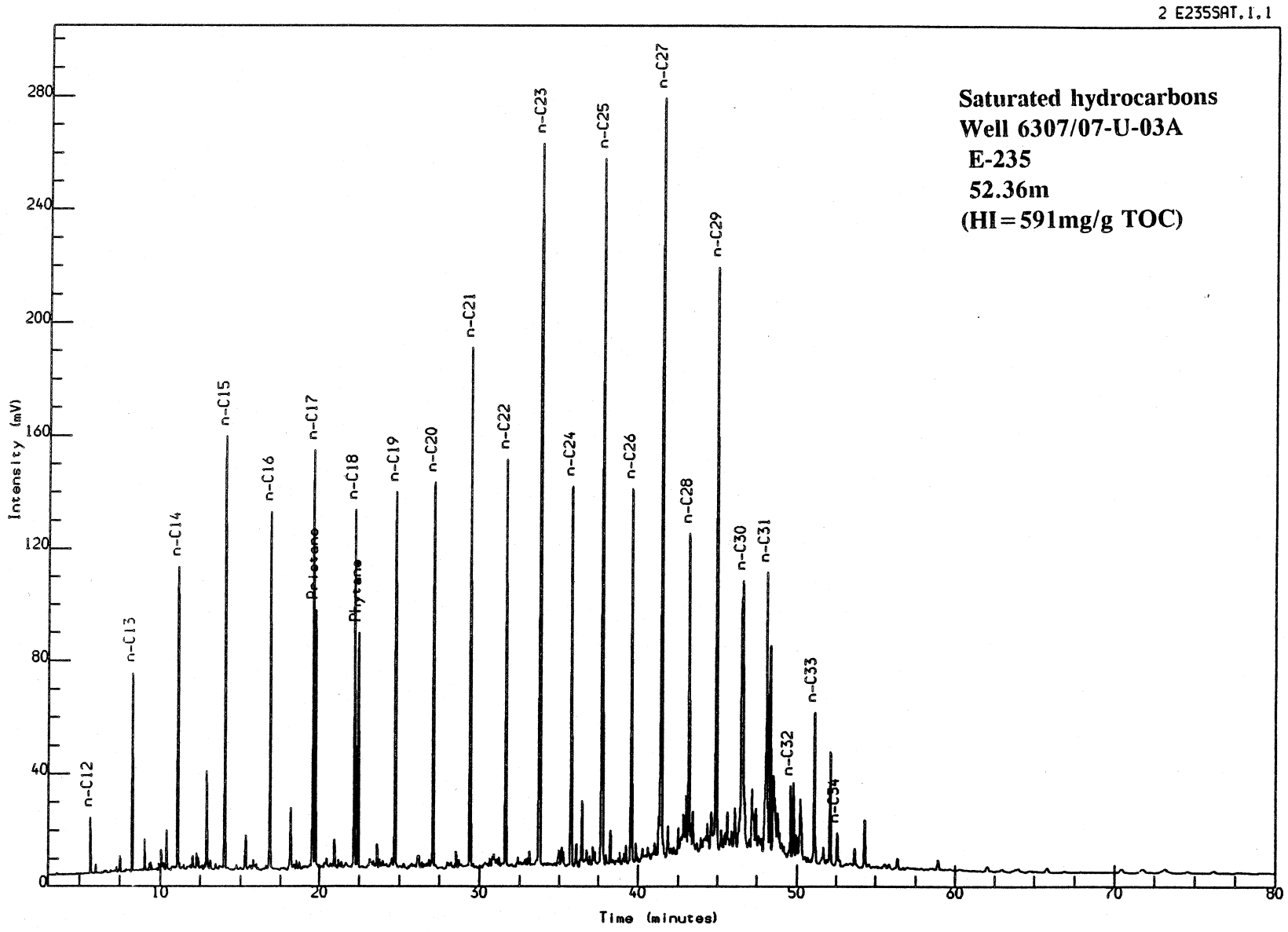

2 E214SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-214
37.34m
(HI=157mg/g TOC)
Intensity (mV)
Time (minutes)
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

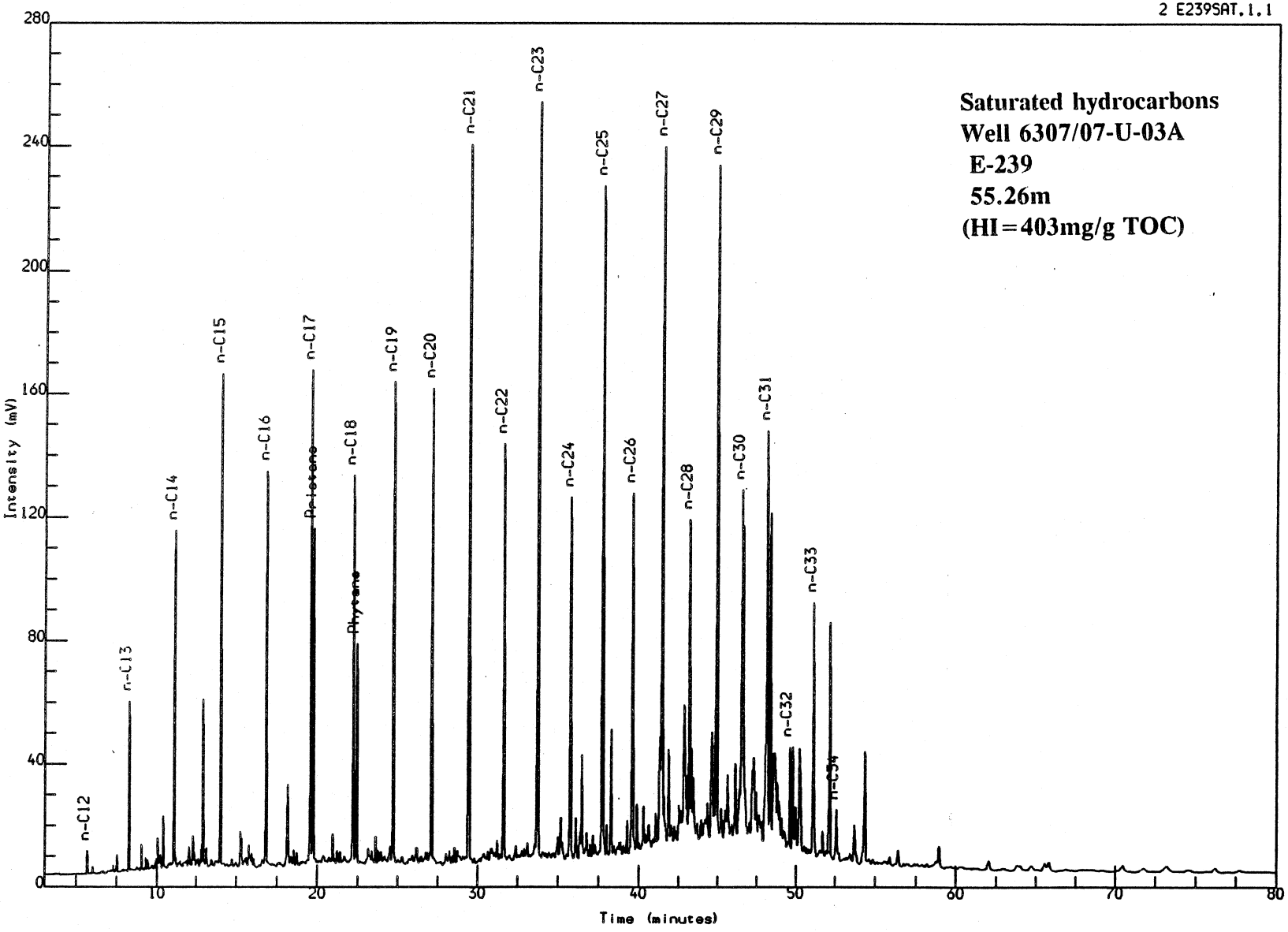

2 E227SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-227
46.20m
(HI=558mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

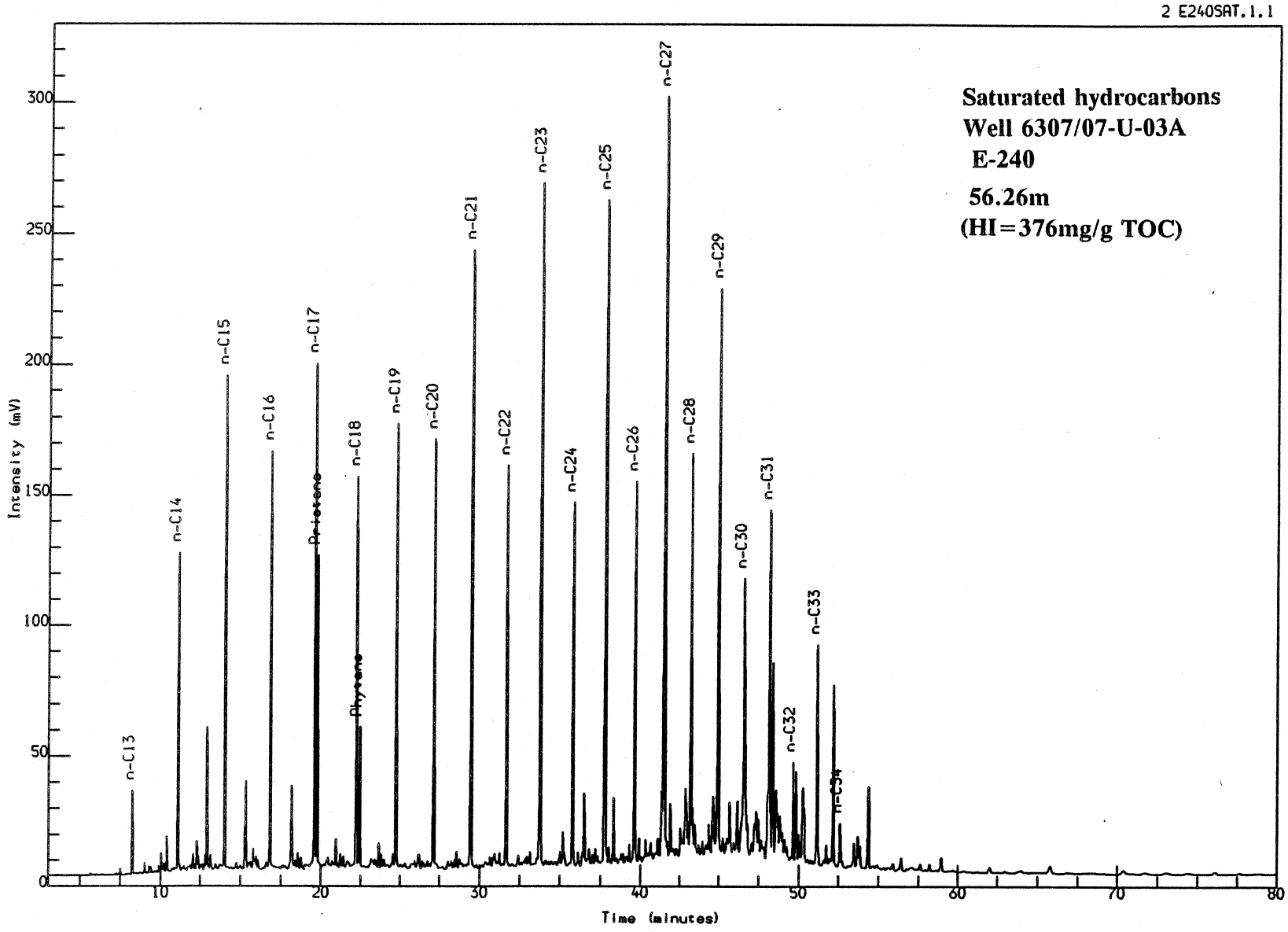

2 E230SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-230
48.77m
(HI=639mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

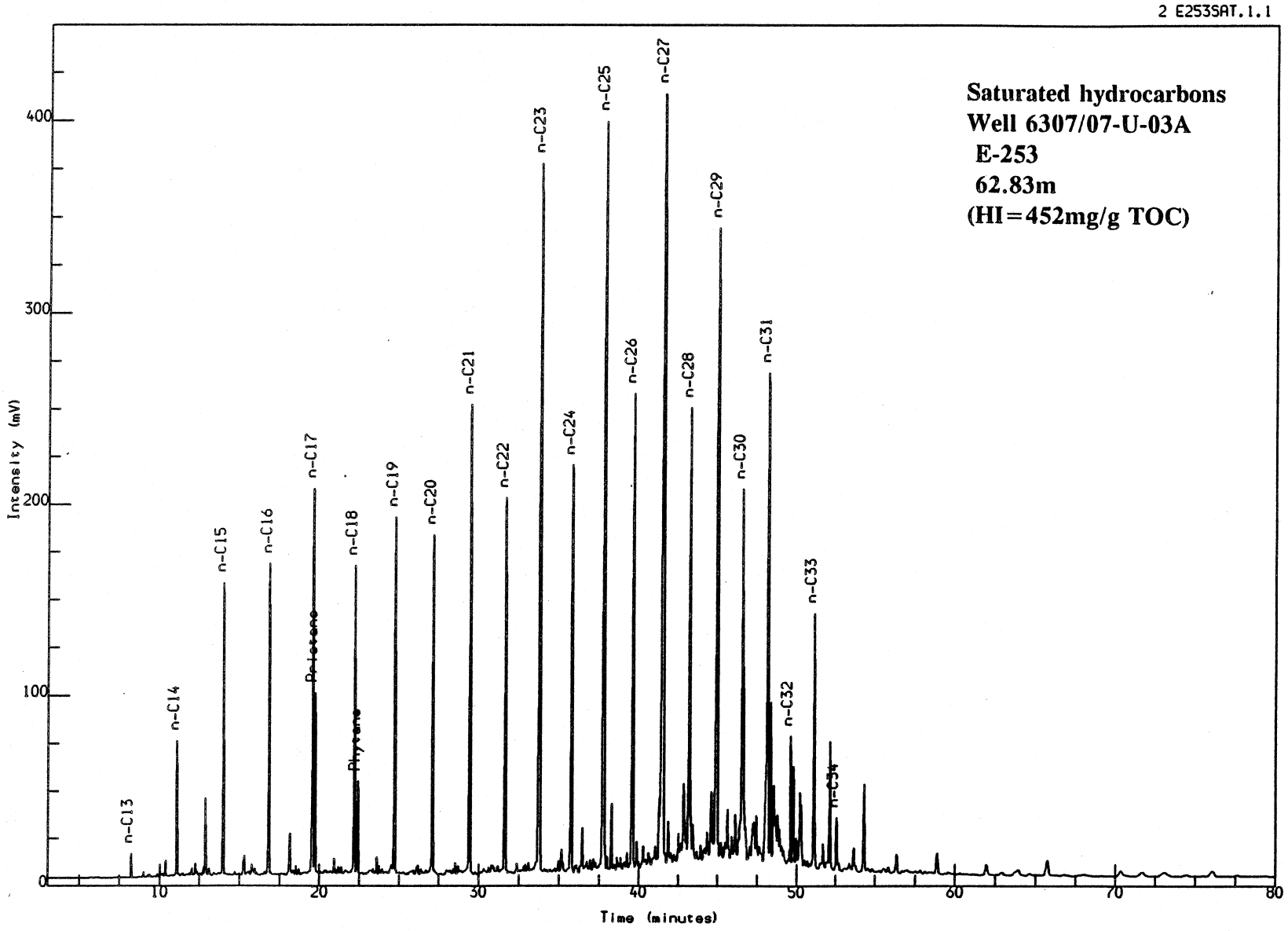

2 E232SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-232
50.77m
(HI=567mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

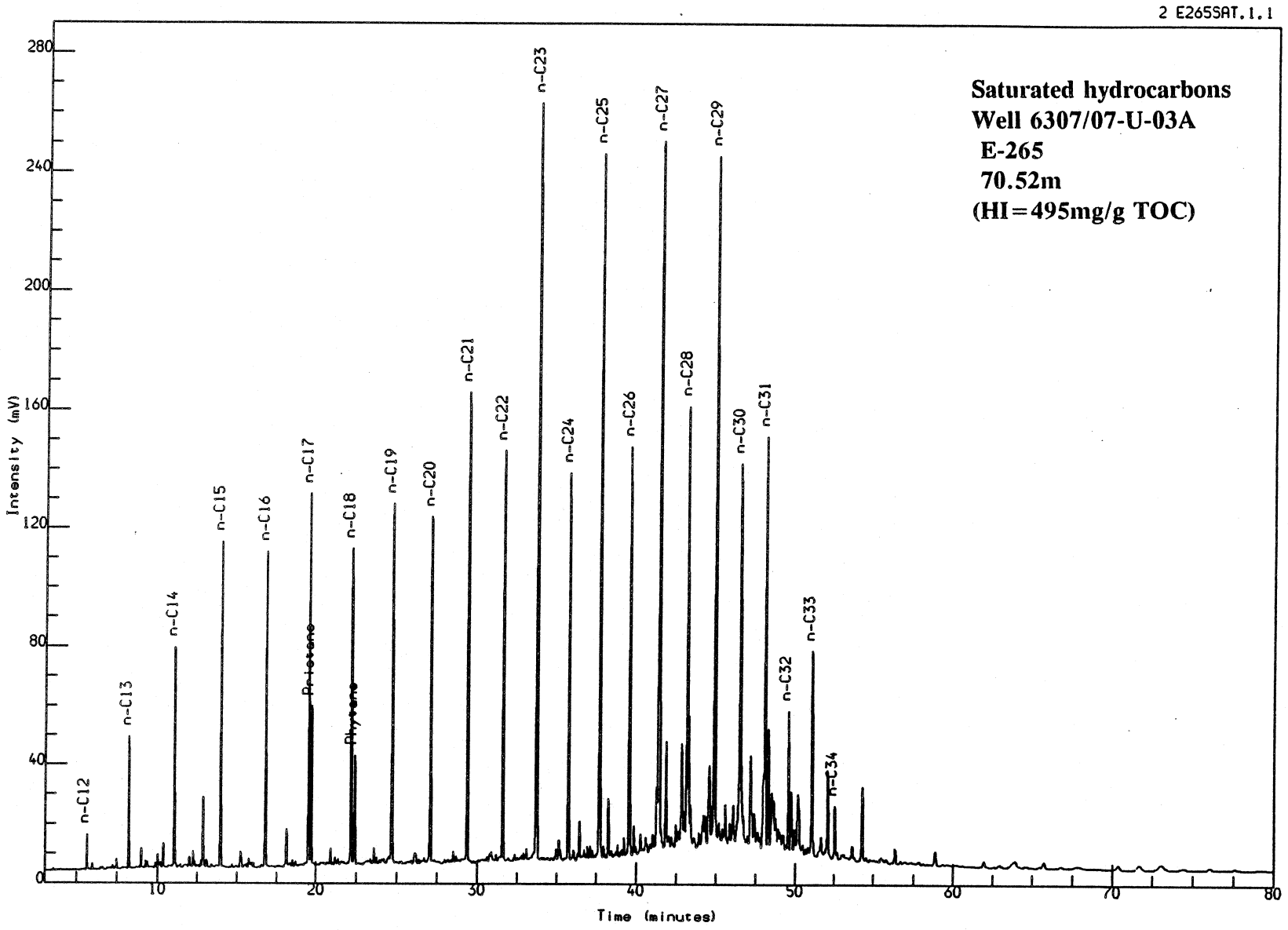

2 E234SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-234
51.36m
(HI=371mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
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n-C27
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n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

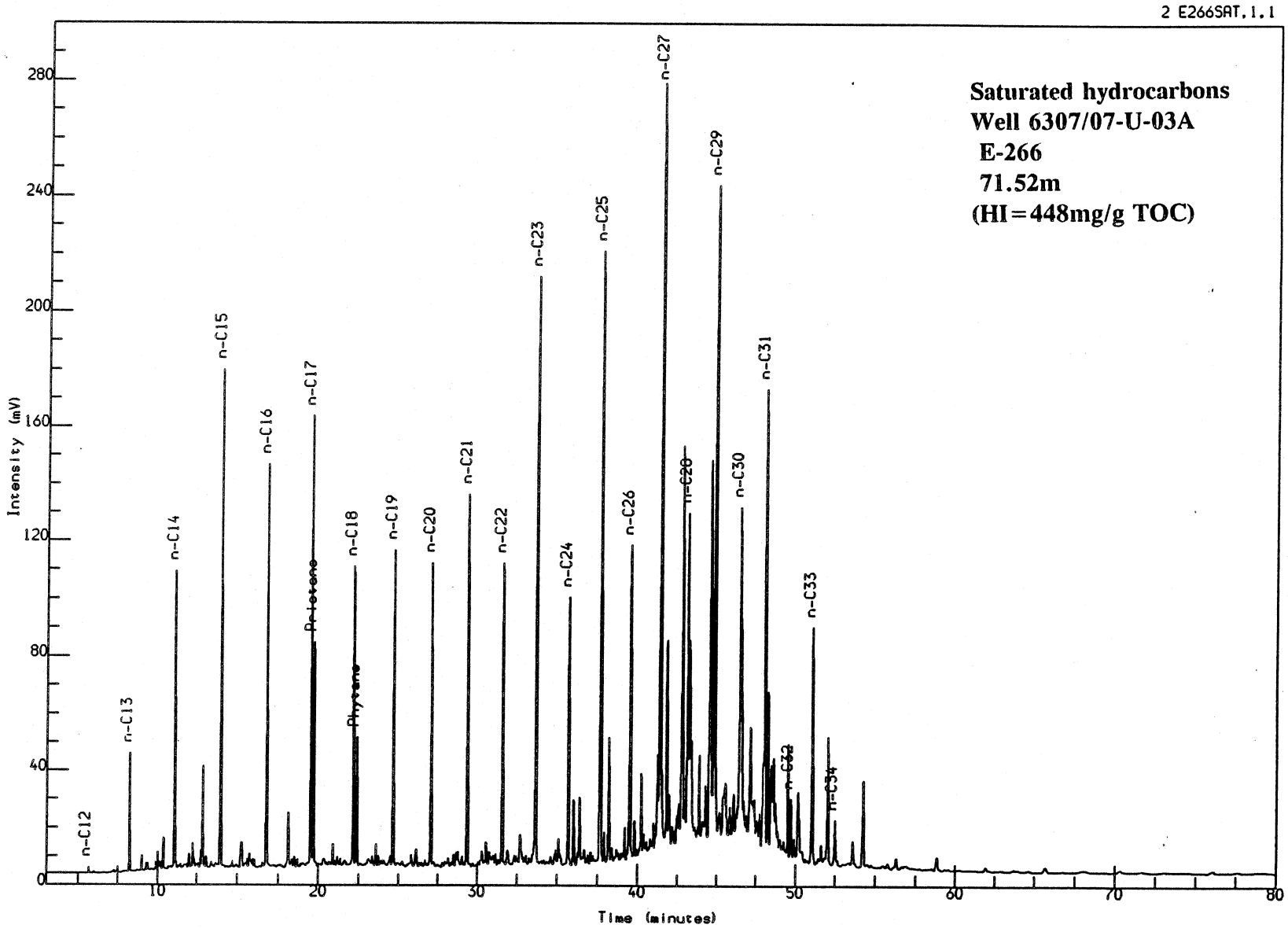

2 E235SAT.I.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-235
52.36m
(HI=591mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E239SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-239
55.26m
(HI=403mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E240SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-240
56.26m
(HI=376mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E253SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-253
62.83m
(HI=452mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E265SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-265
70.52m
(HI=495mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E266SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-266
71.52m
(HI=448mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
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n-C31
n-C33
n-C34

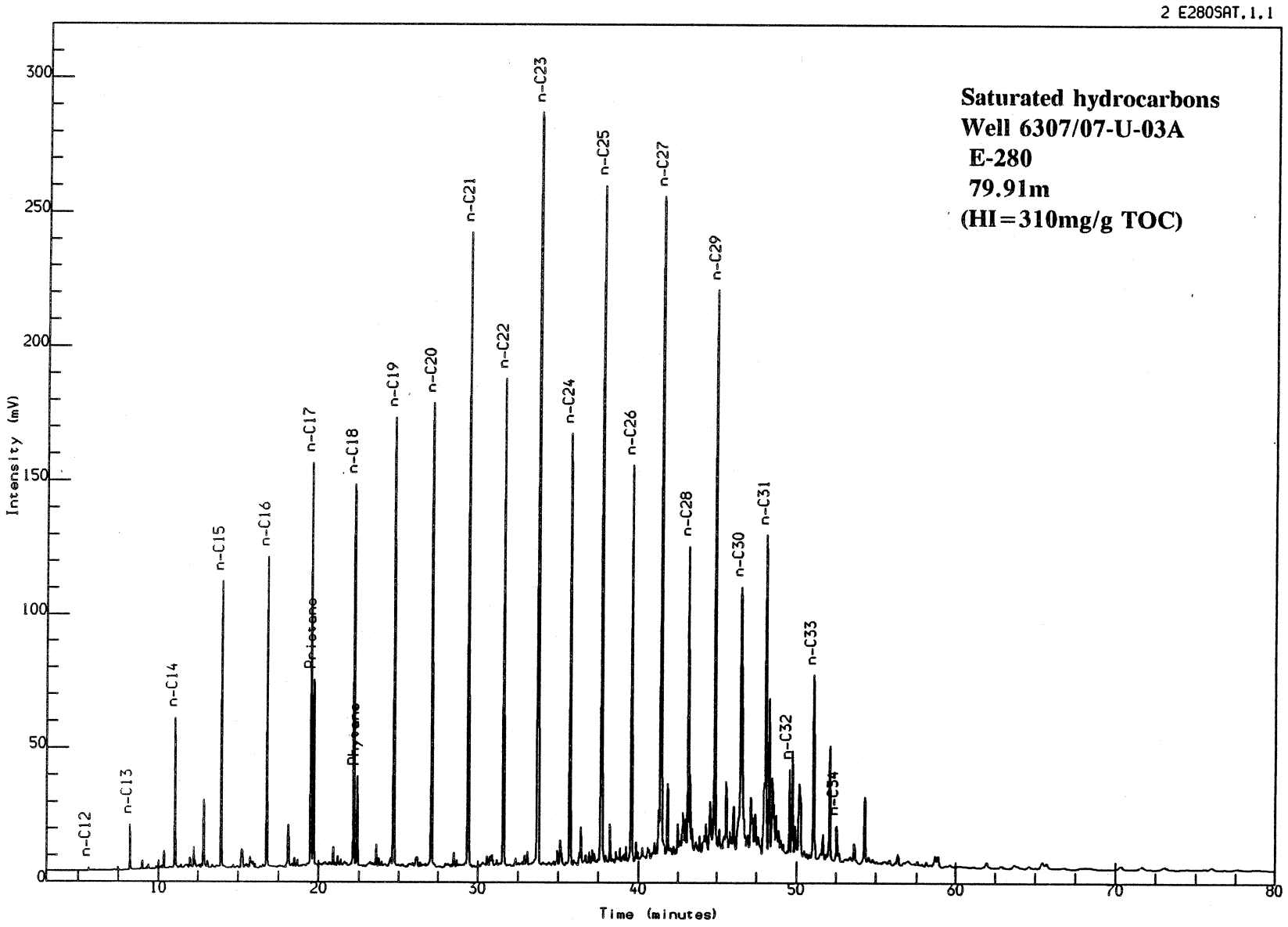
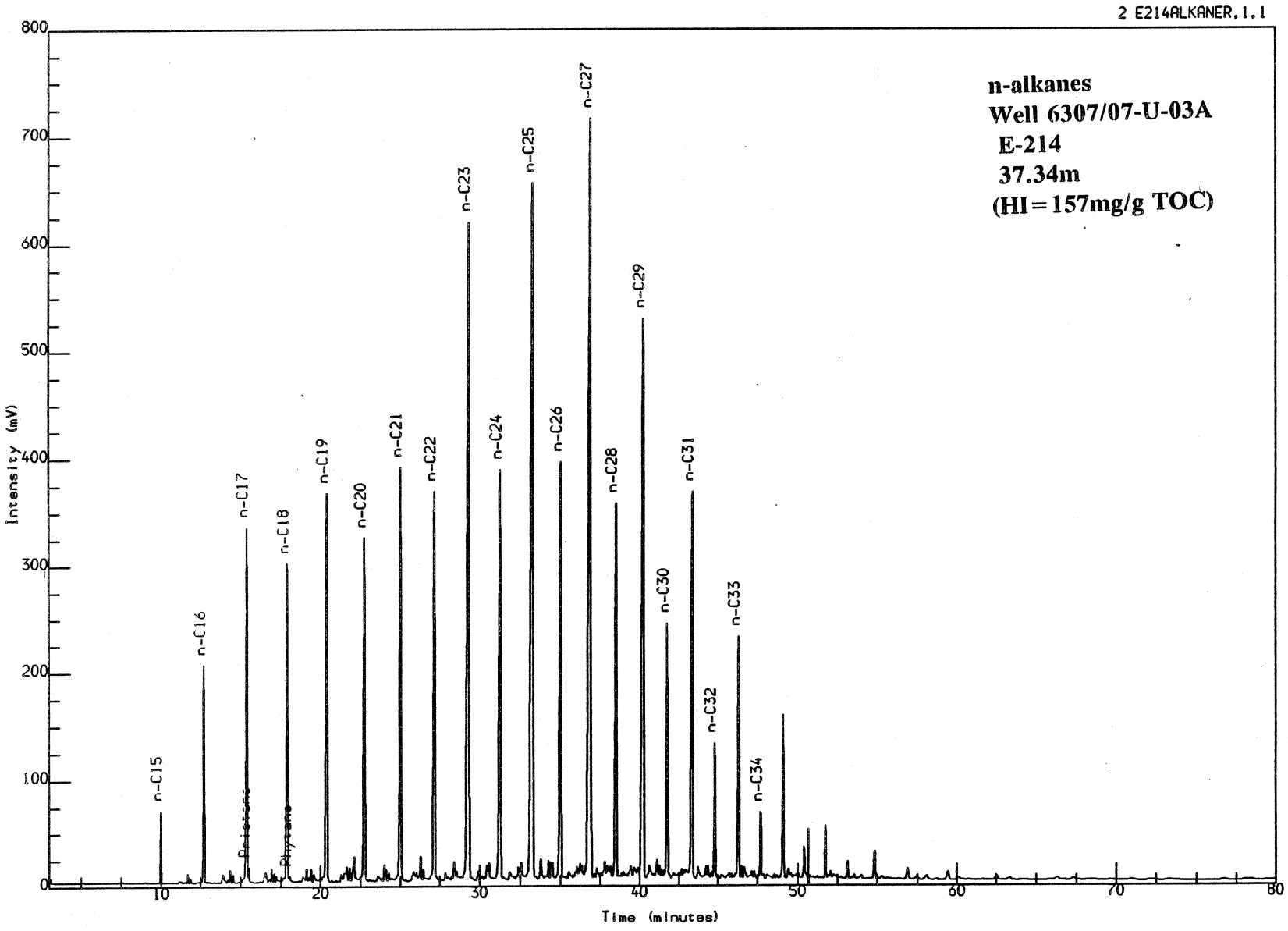

2 E280SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-03A
E-280
79.91m
(HI=310mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
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n-C28
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n-C30
n-C31
n-C32
n-C33
n-C34

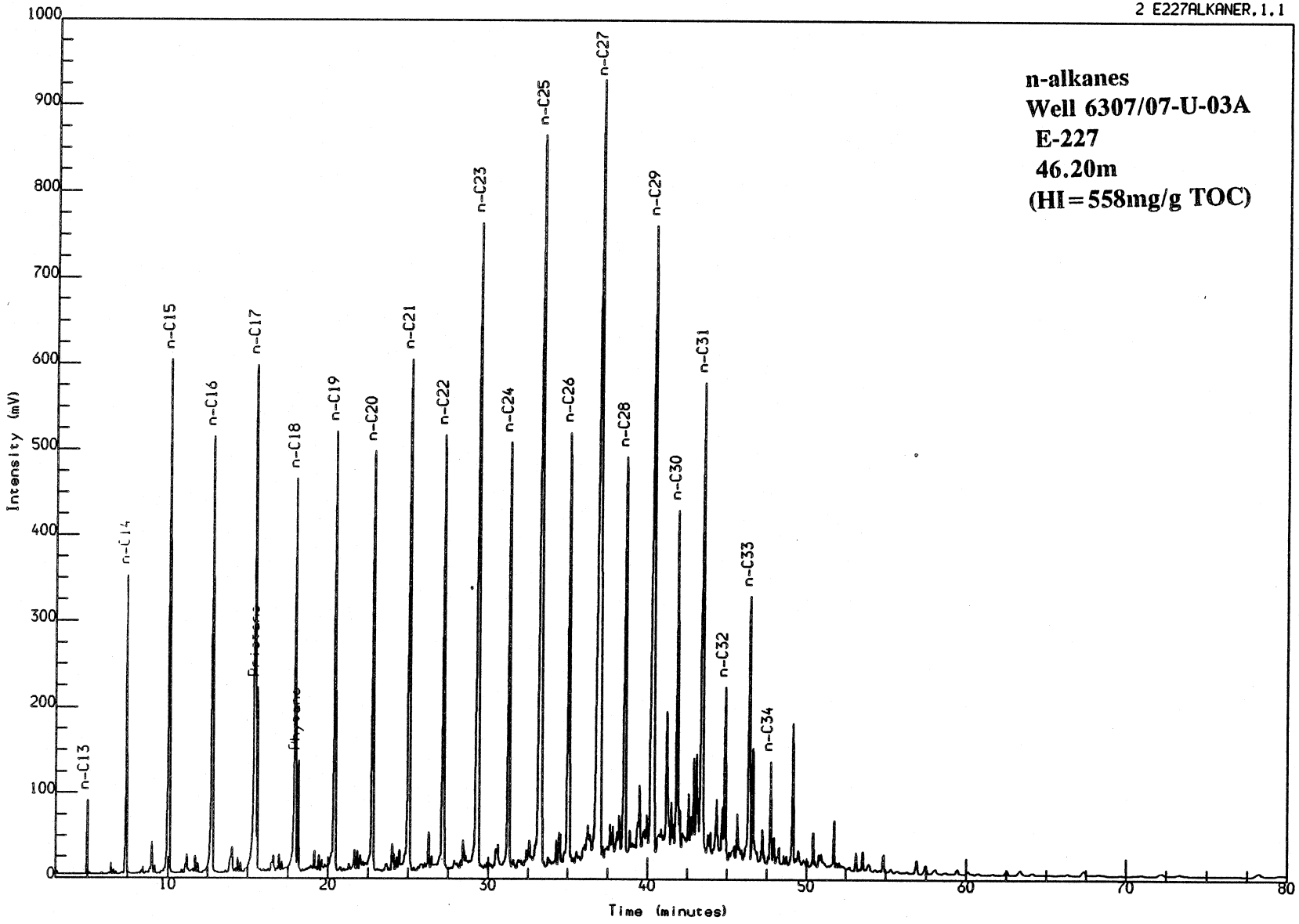
Figure III.5.2

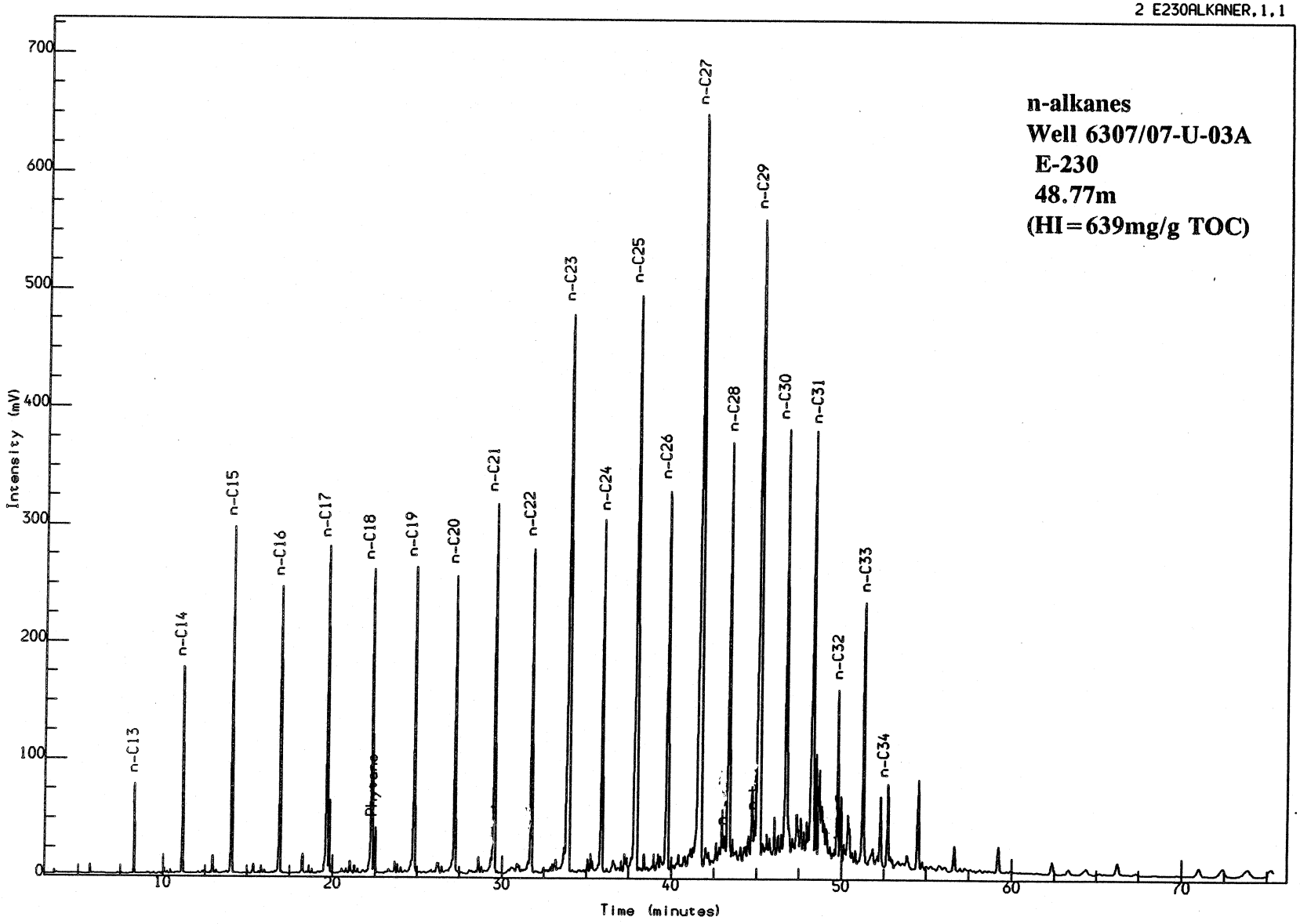
Gas chromatograms

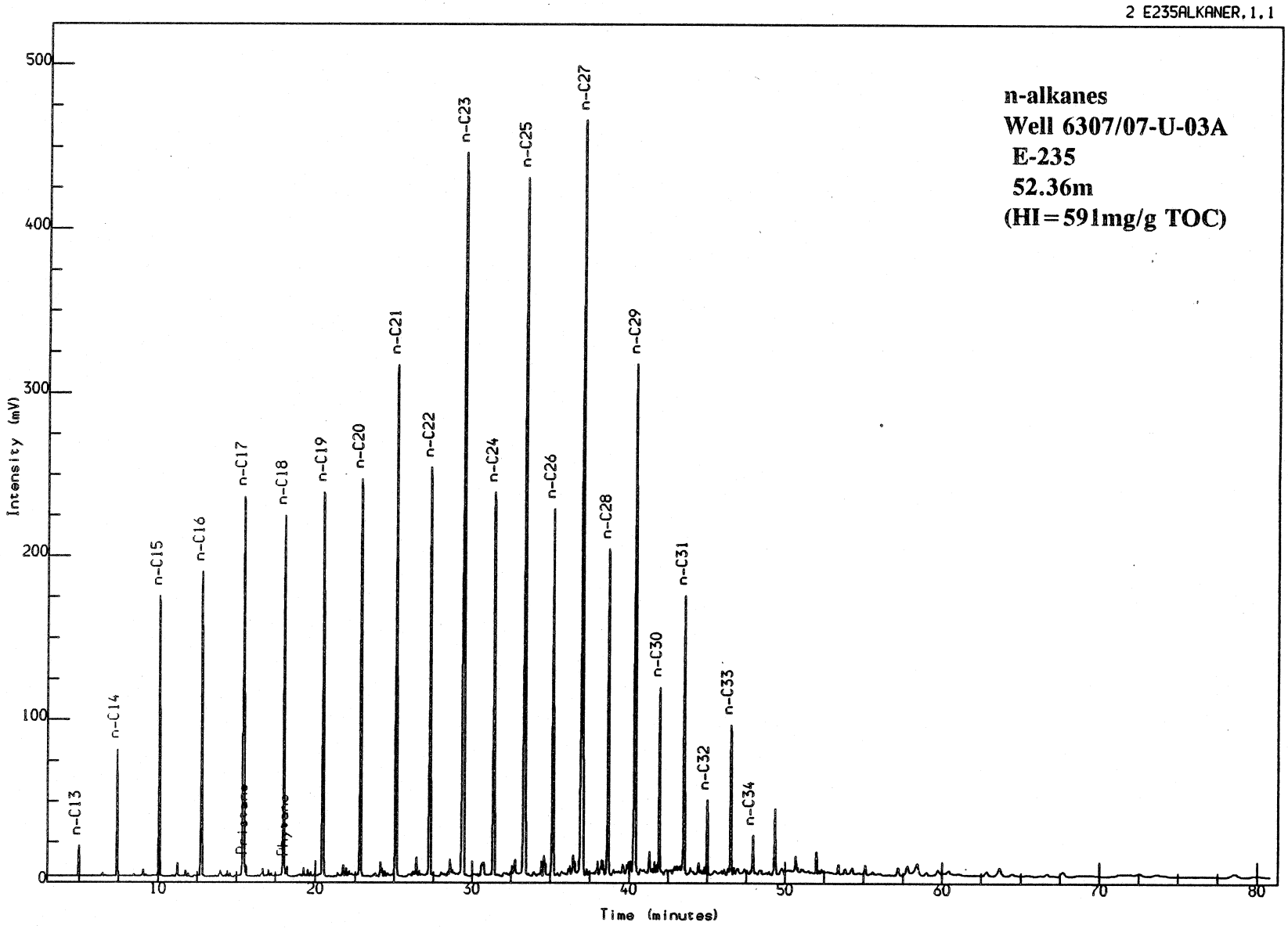
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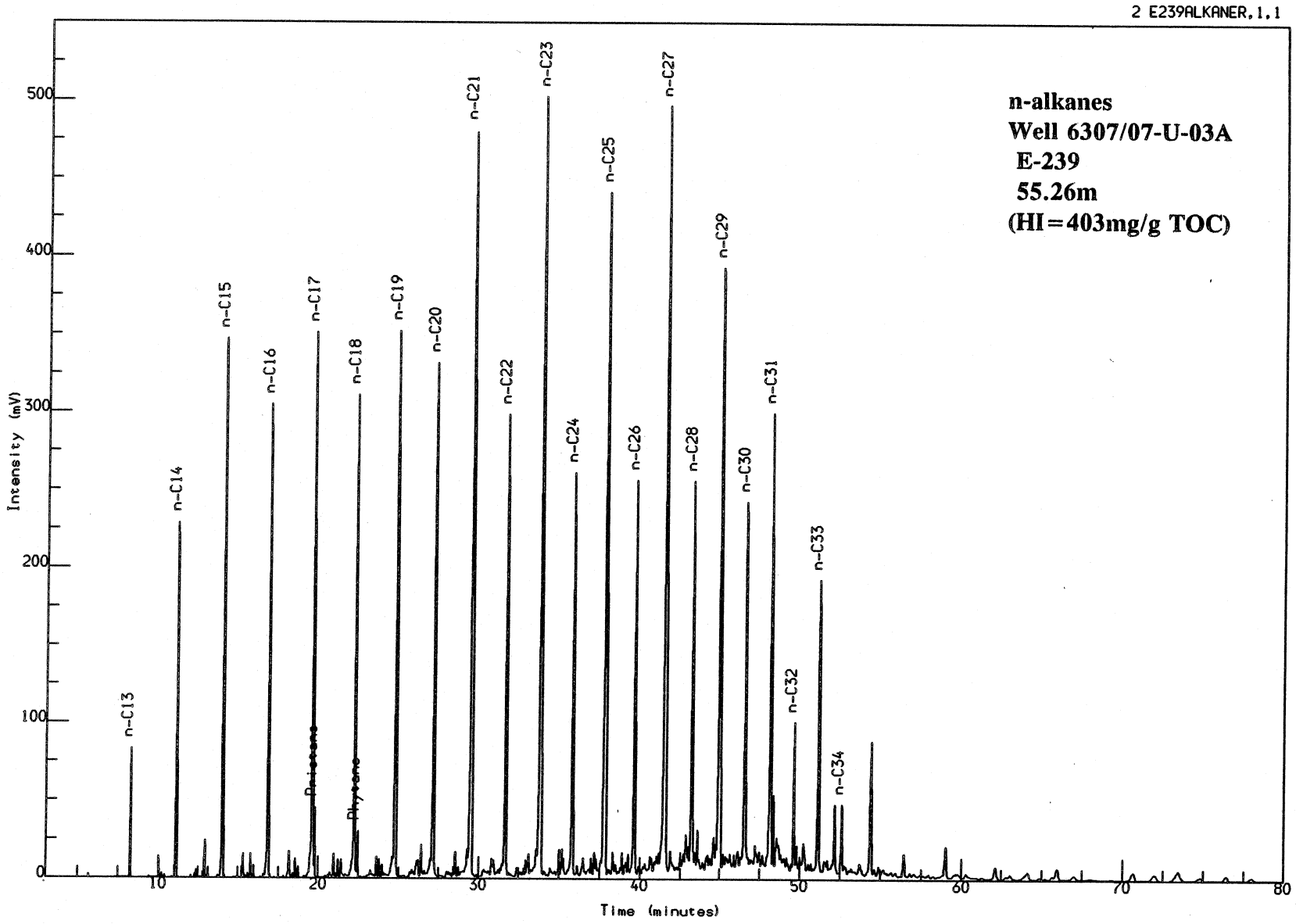
n-alkanes

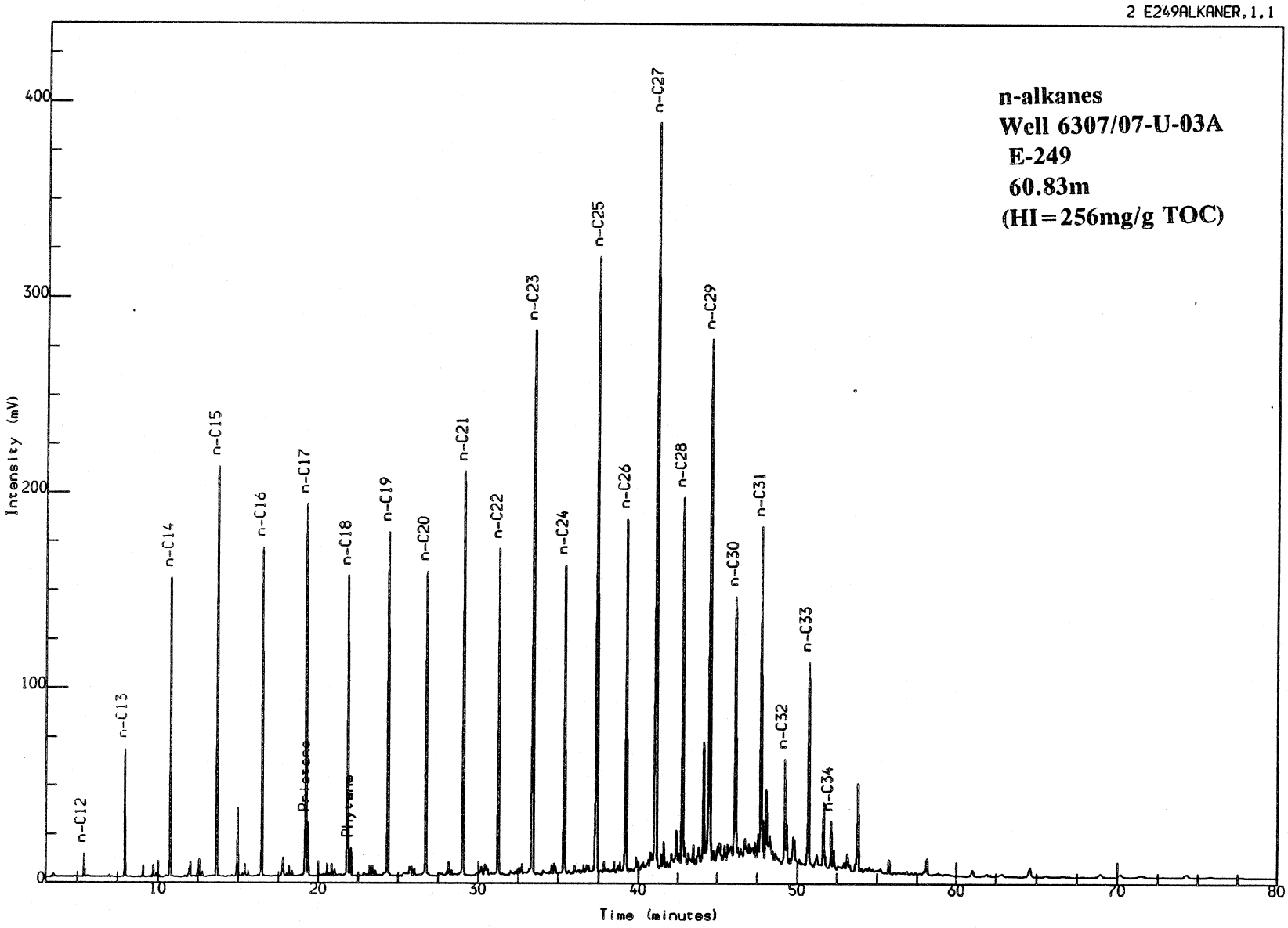

2 E214ALKANER.1.1
n-alkanes
Well 6307/07-U-03A
E-214
37.34m
(HI=157mg/g TOC)
Intensity (mV)
Time (minutes)
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

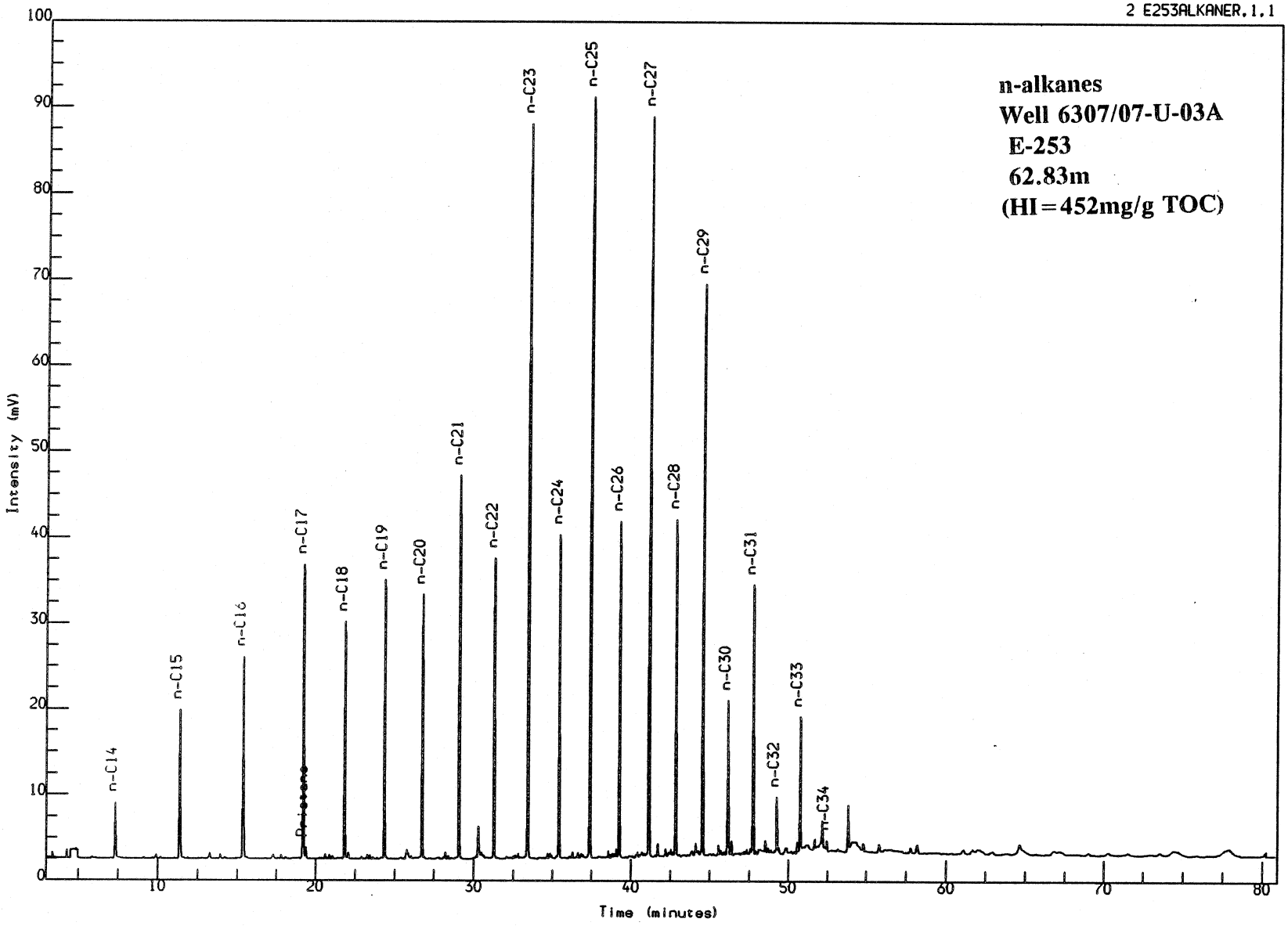

2 E227ALKANER.1.1
n-alkanes
Well 6307/07-U-03A
E-227
46.20m
(HI=558mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

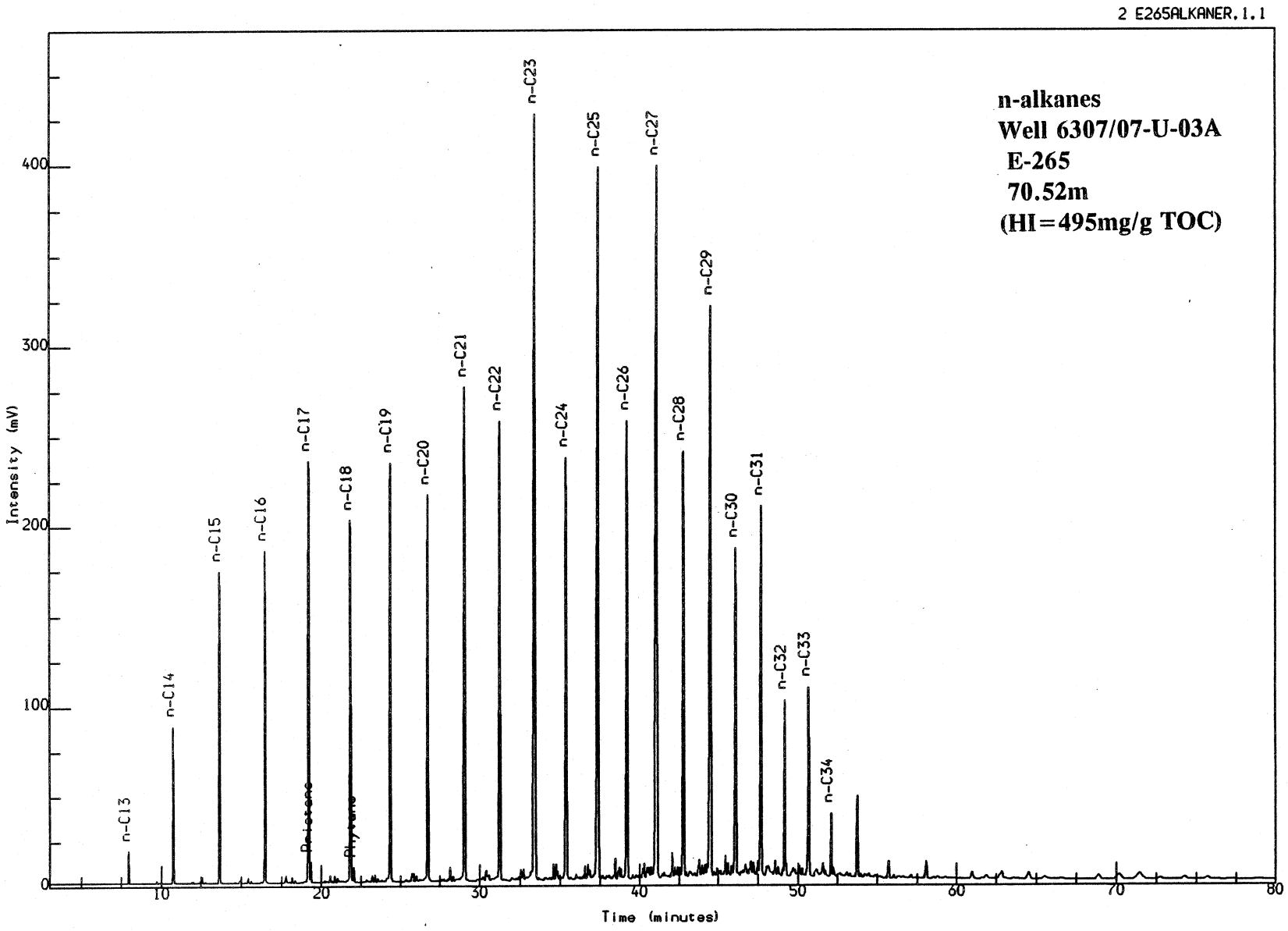

2 E230ALKANER,1,1
n-alkanes
Well 6307/07-U-03A
E-230
48.77m
(HI=639mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E235ALKANER, 1.1
n-alkanes
Well 6307/07-U-03A
E-235
52.36m
(HI=591mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E239ALKANER,1,1
n-alkanes
Well 6307/07-U-03A
E-239
55.26m
(HI=403mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E249ALKANER,1.1
n-alkanes
Well 6307/07-U-03A
E-249
60.83m
(HI=256mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E253ALKANER.1.1
n-alkanes
Well 6307/07-U-03A
E-253
62.83m
(HI=452mg/g TOC)
Intensity (mV)
Time (minutes)
n-C14
n-C15
n-C16
Pristane
n-C17
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E265ALKANER.1.1
n-alkanes
Well 6307/07-U-03A
E-265
70.52m
(HI=495mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
Phytane
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34

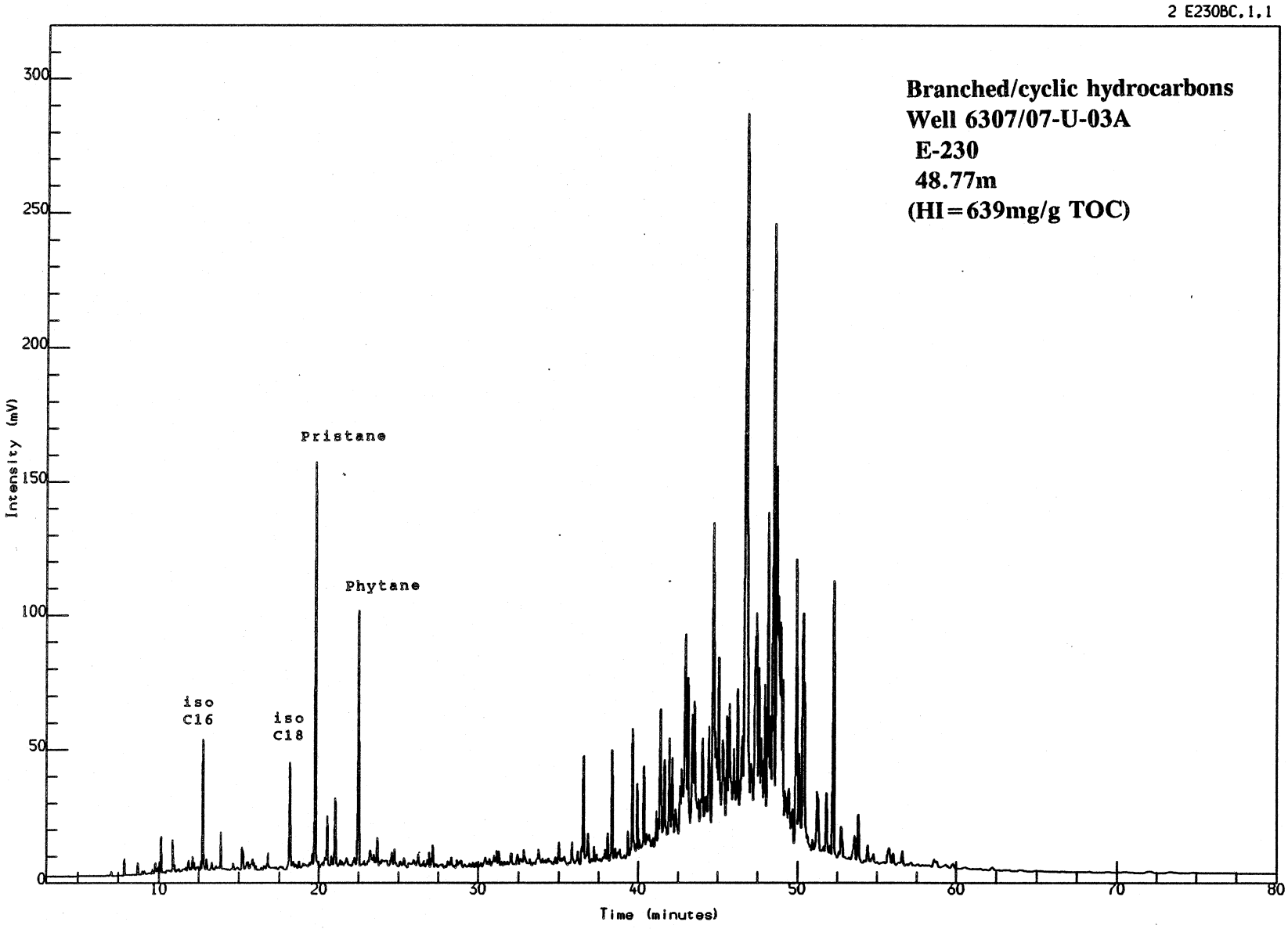
IKU SINTEF-GRUPPEN

Figure III.5.3

Gas chromatogram

of

branched/cycloalkanes


2 E230BC.1.1
Branched/cyclic hydrocarbons
Well 6307/07-U-03A
E-230
48.77m
(HI=639mg/g TOC)
Pristane
Phytane
iso C16
iso C18
Intensity (mV)
Time (minutes)
0
50
100
150
200
250
300
10
20
30
40
50
60
70
80

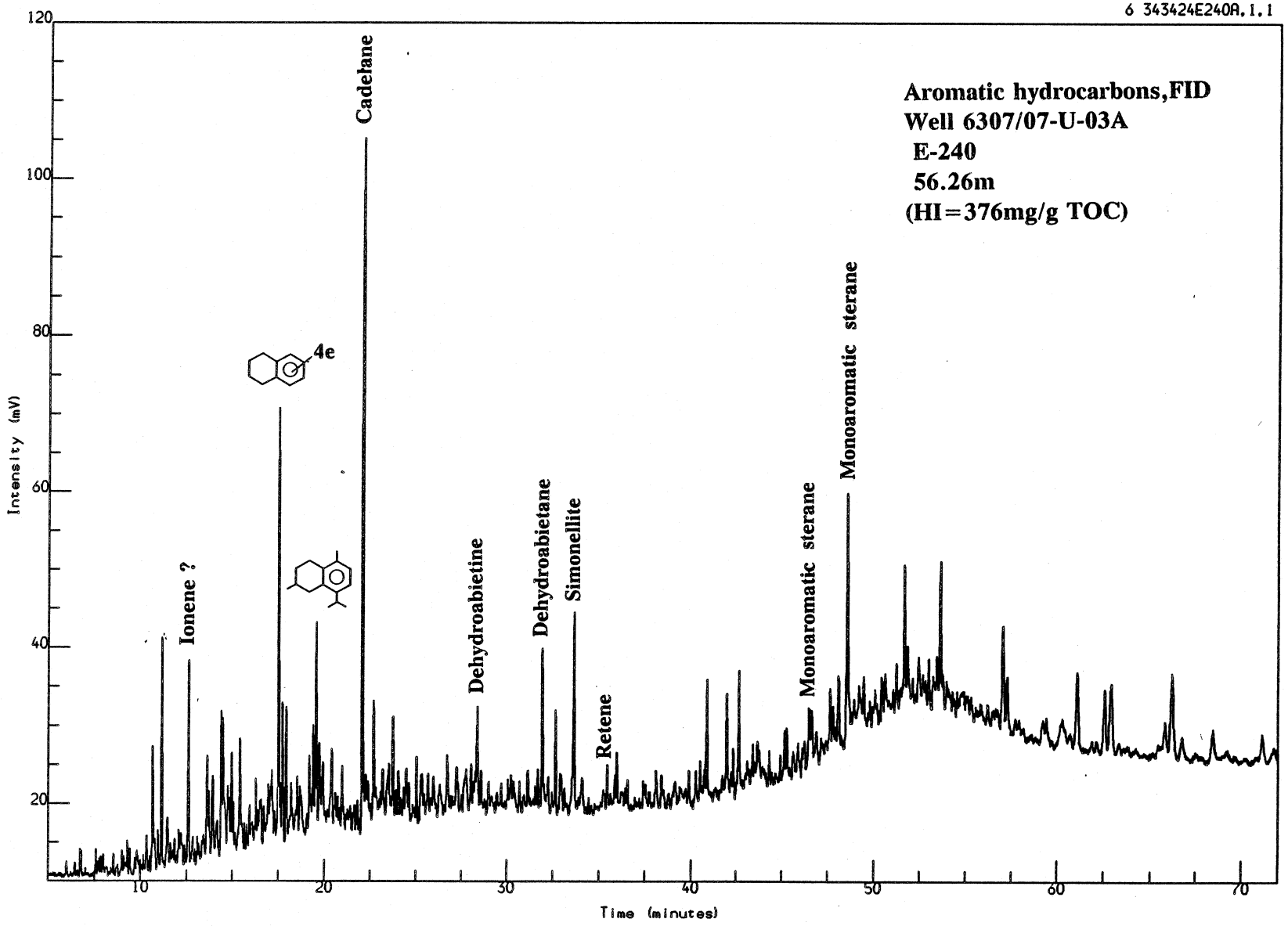
IKU SINTEF-GRUPPEN

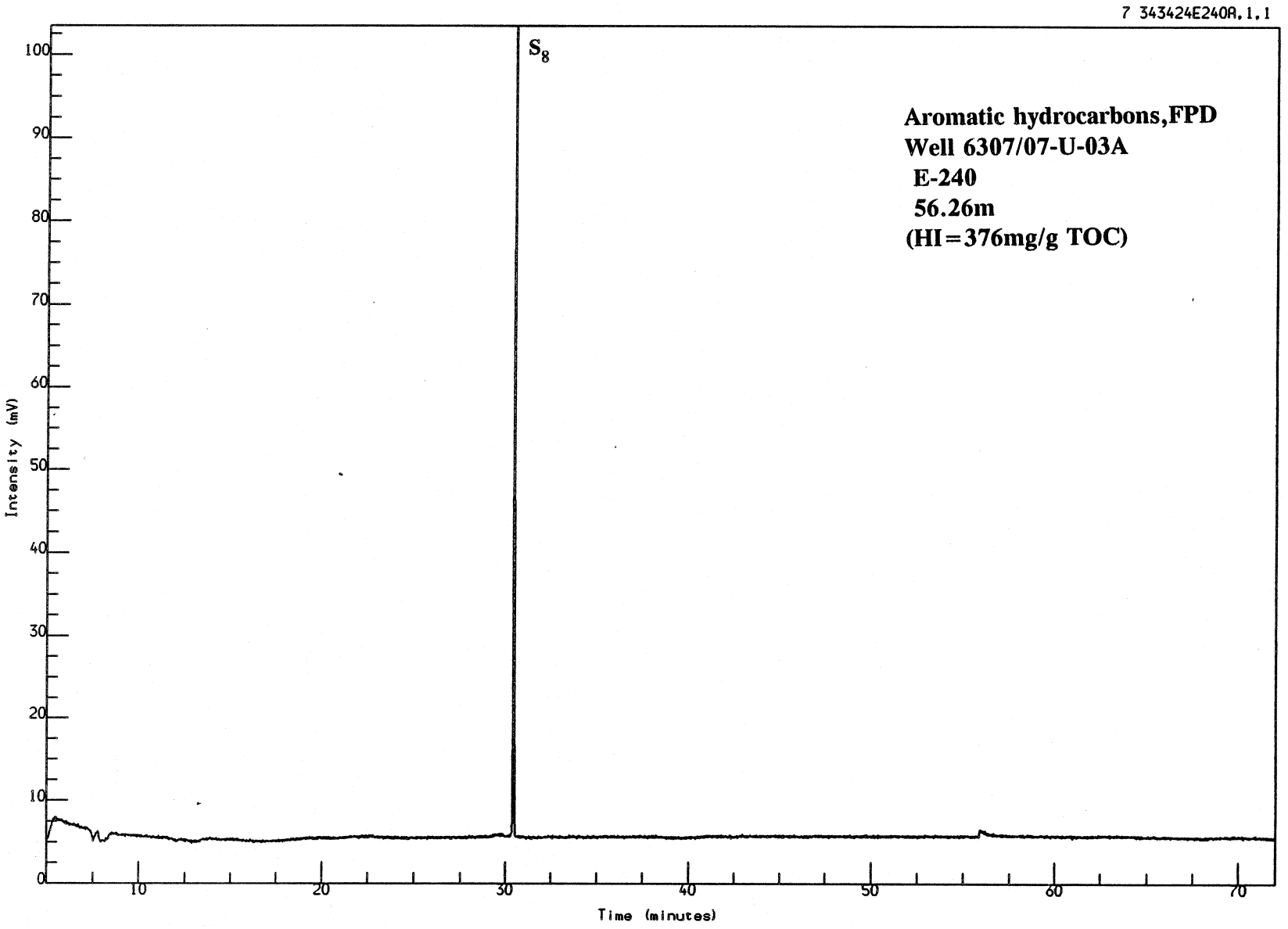
Figure III.5.4

Gas chromatograms (FID/FPD)

of

arenes and sulphur (aromatics)


6 343424E240A.1.1
Aromatic hydrocarbons,FID
Well 6307/07-U-03A
E-240
56.26m
(HI=376mg/g TOC)
Intensity (mV)
Time (minutes)
Ionene ?
4e
Cadelane
Dehydroabietine
Dehydroabietane
Simonellite
Retene
Monoaromatic sterane
Monoaromatic sterane


7 343424E240A.1.1
S_8
Aromatic hydrocarbons,FPD
Well 6307/07-U-03A
E-240
56.26m
(HI=376mg/g TOC)
Intensity (mV)
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
Time (minutes)

IKU SINTEF-GRUPPEN

Figure III.5.5a

GC-MS

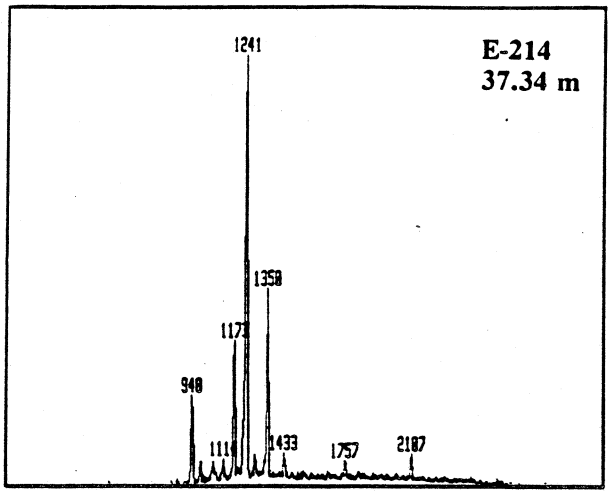
of

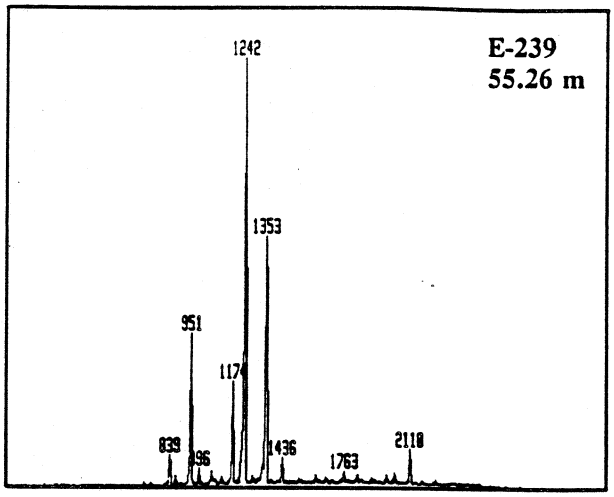
branched/cycloalkanes in extracts

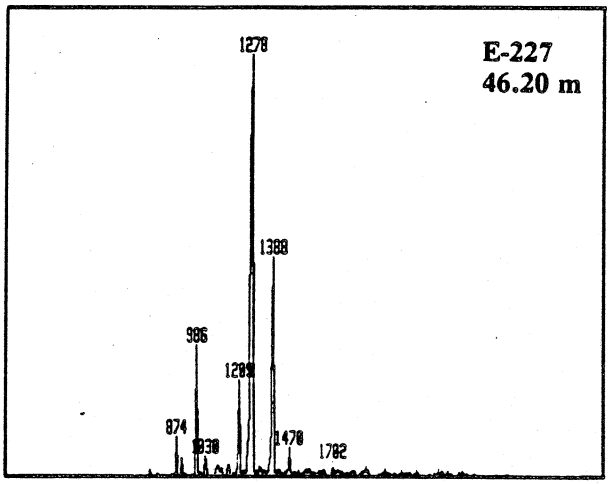
m/z 113

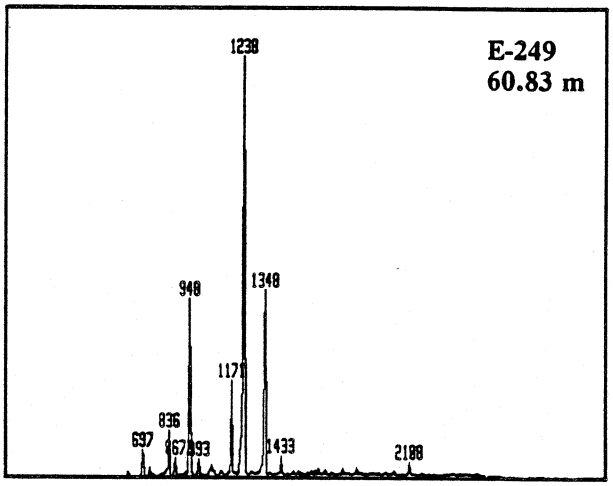
(Further identification of peaks, see section II)

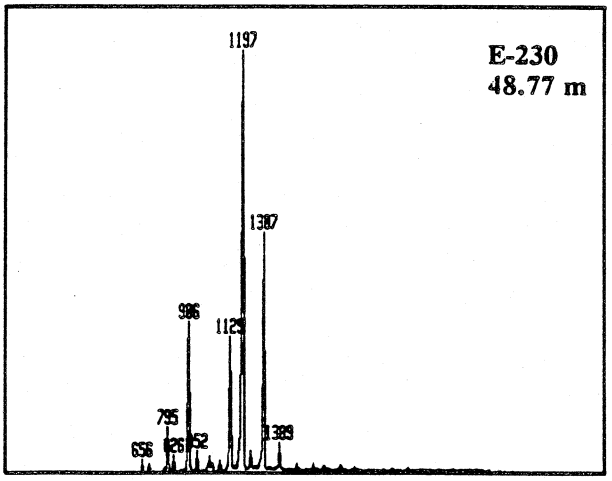
m/z 113 Isoprenoids. Core 6307/07-U-03A

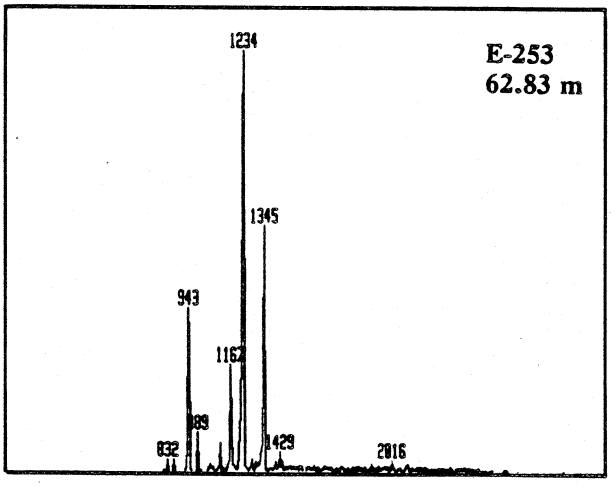


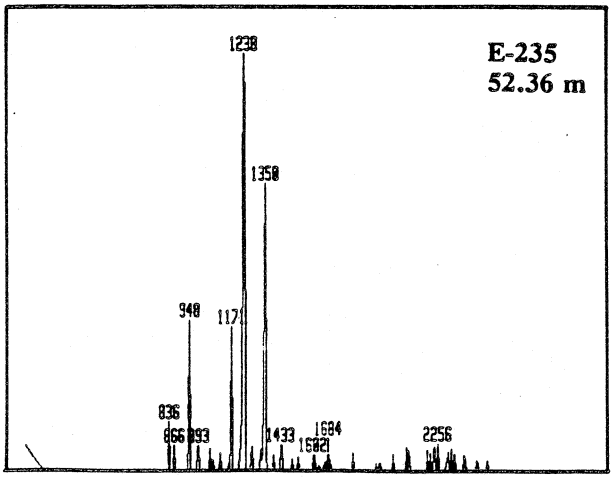


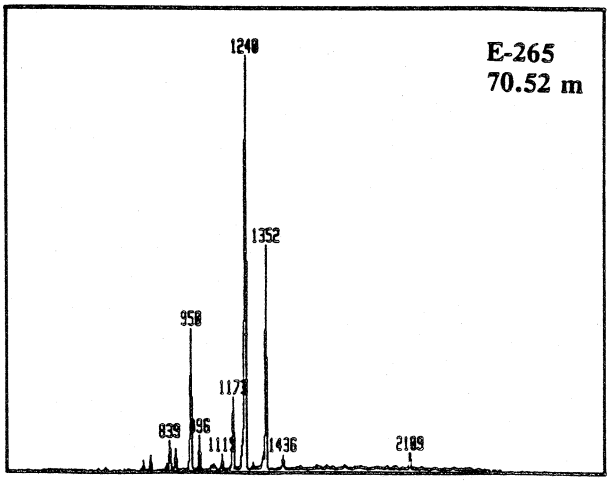


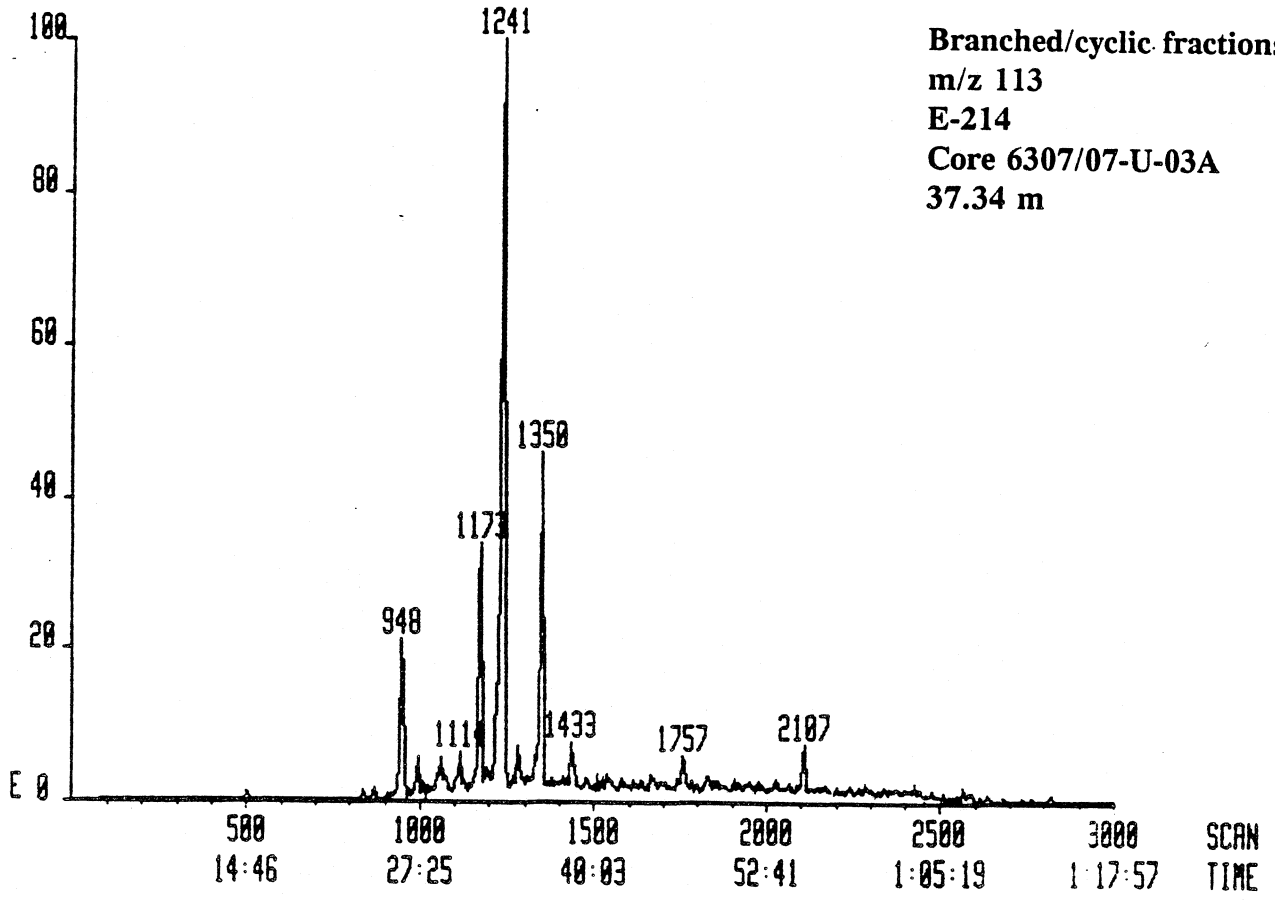




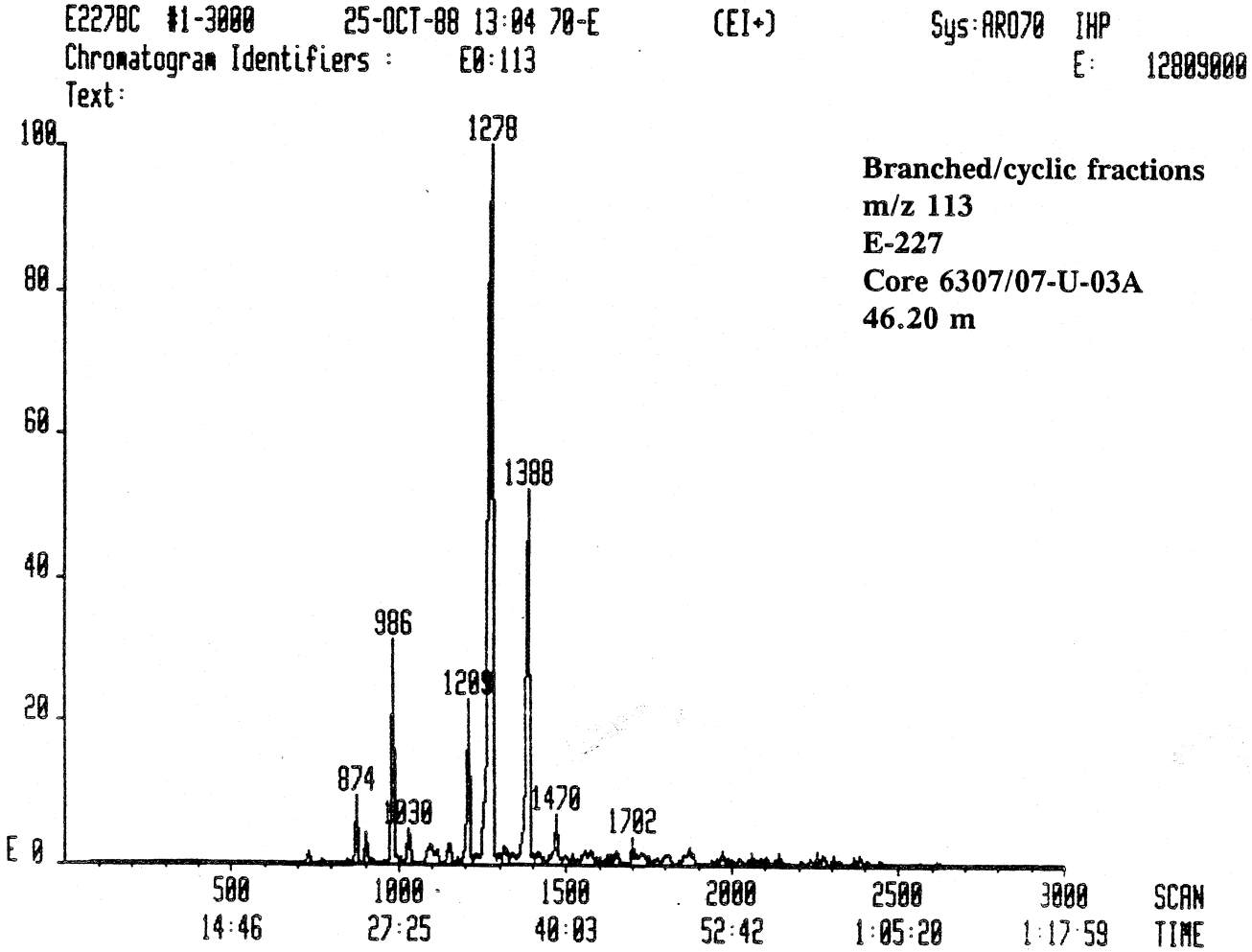




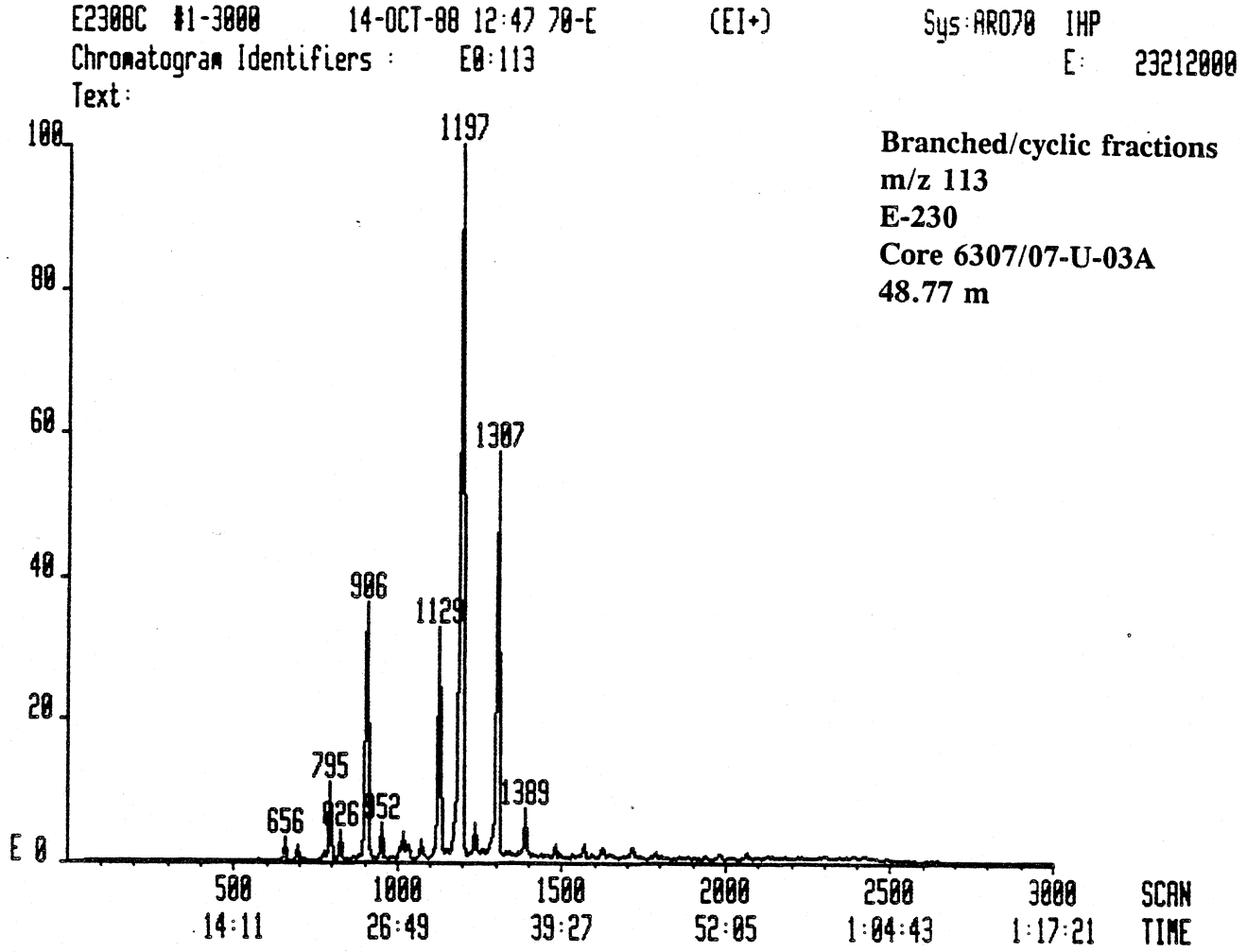




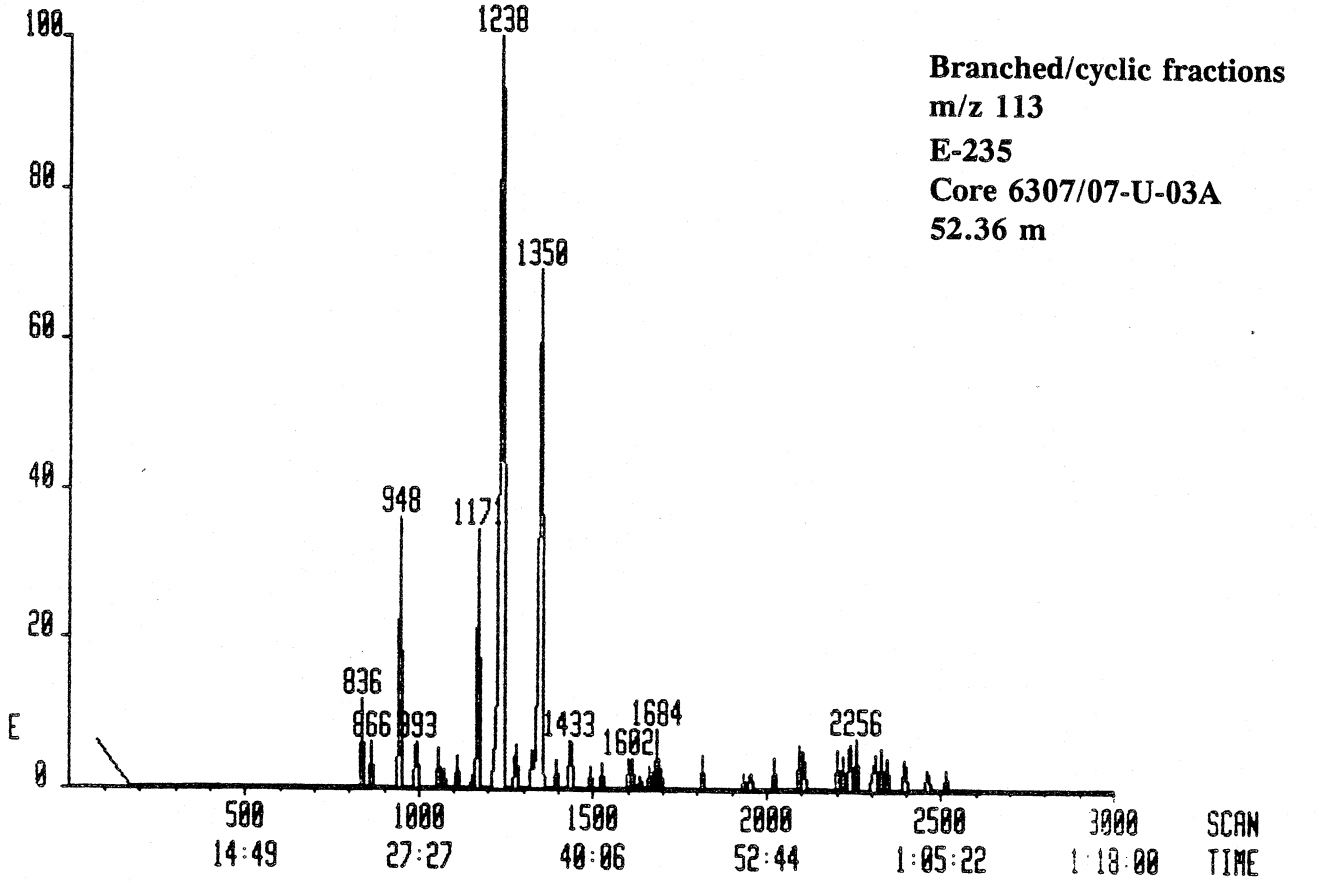
Branched/cyclic fractions
m/z 113
E-214
Core 6307/07-U-03A
37.34 m



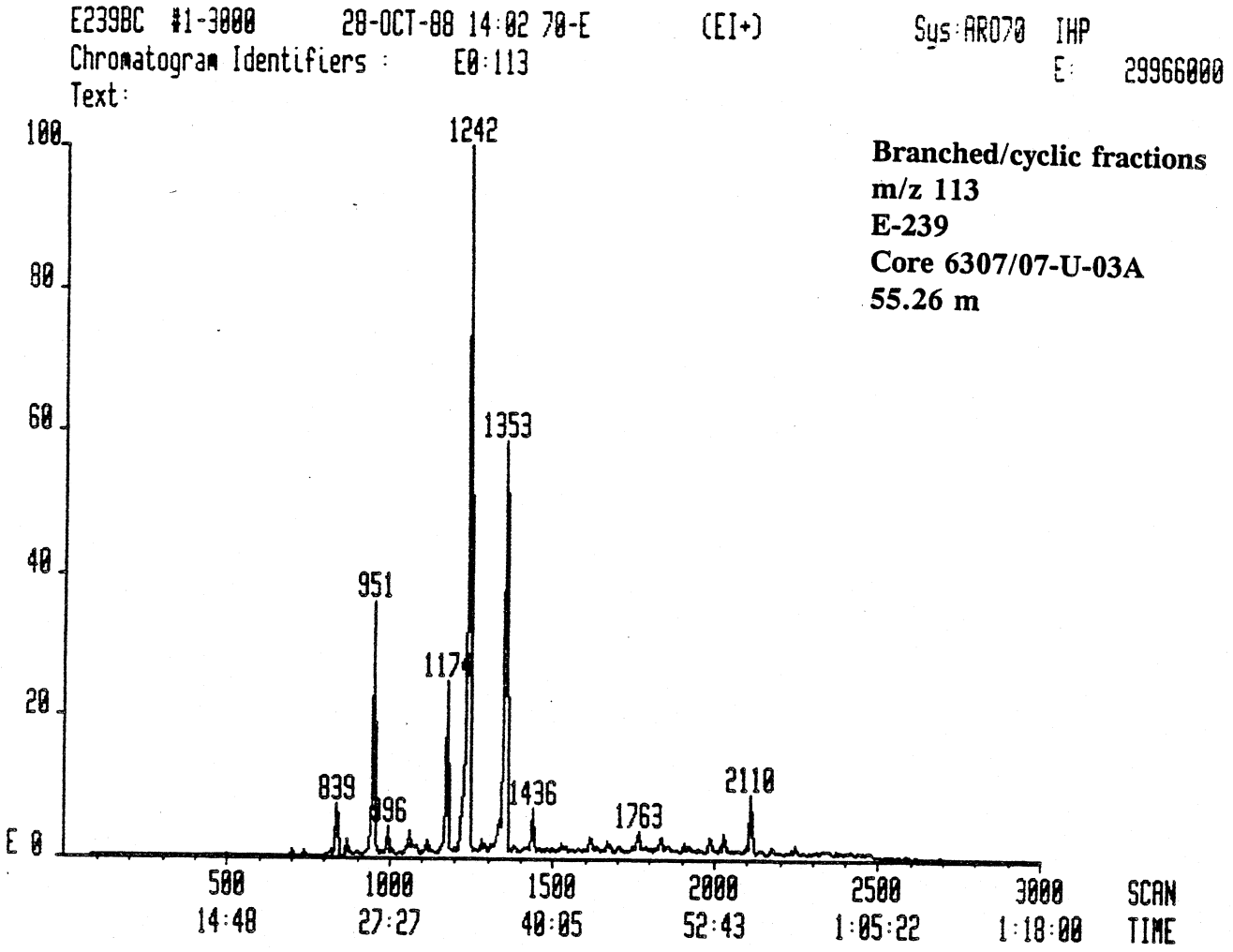
Branched/cyclic fractions
m/z 113
E-227
Core 6307/07-U-03A
46.20 m



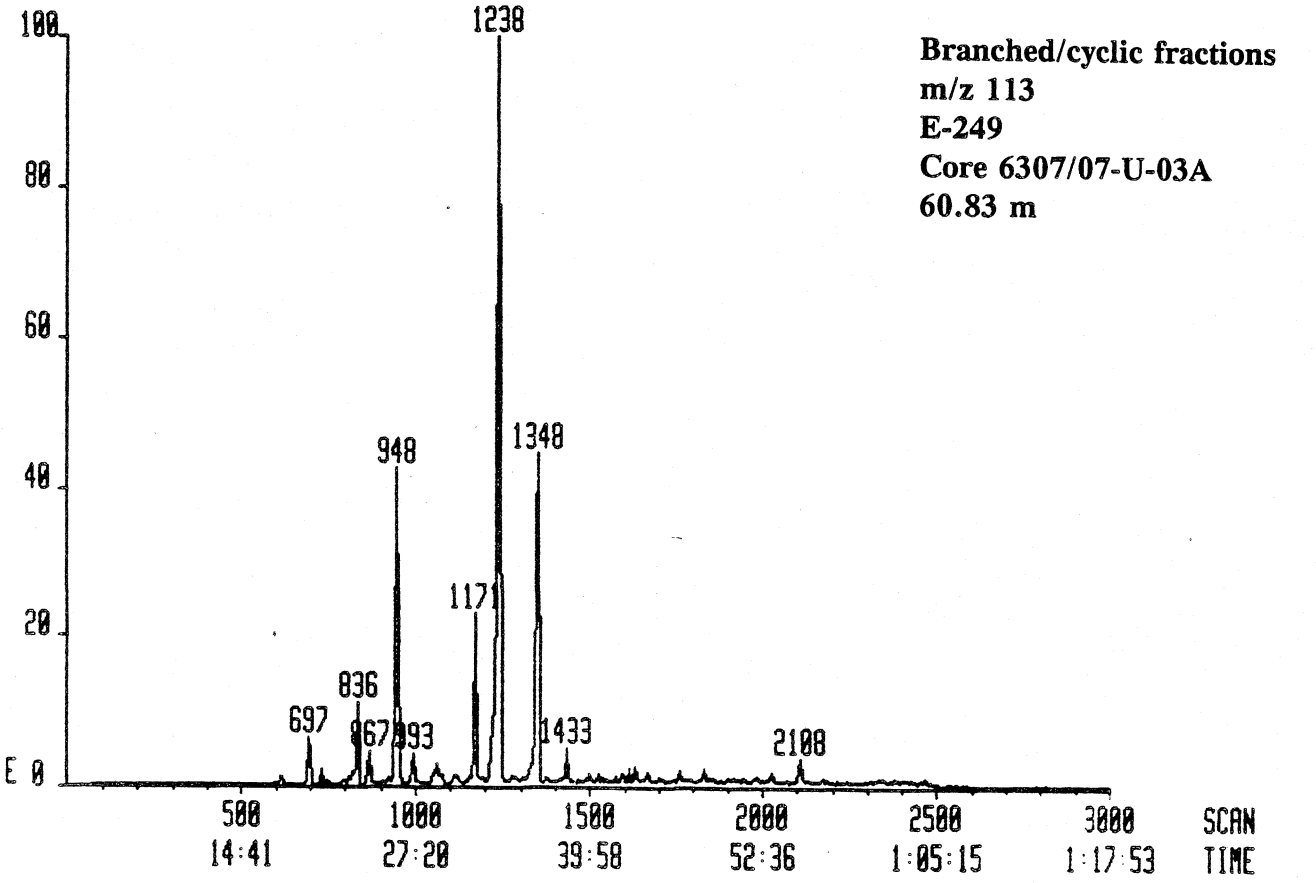
Branched/cyclic fractions
m/z 113
E-230
Core 6307/07-U-03A
48.77 m



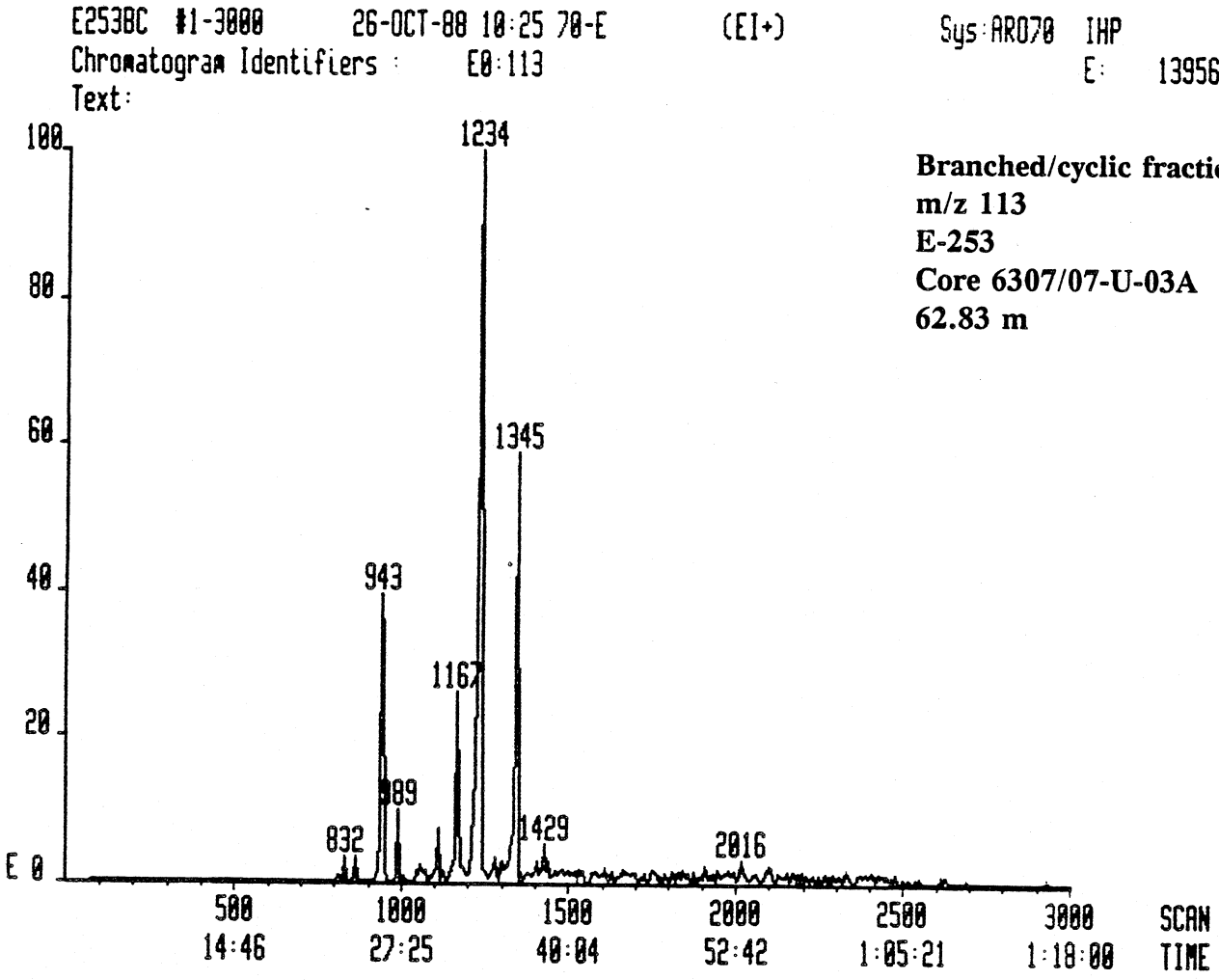
Branched/cyclic fractions
m/z 113
E-235
Core 6307/07-U-03A
52.36 m



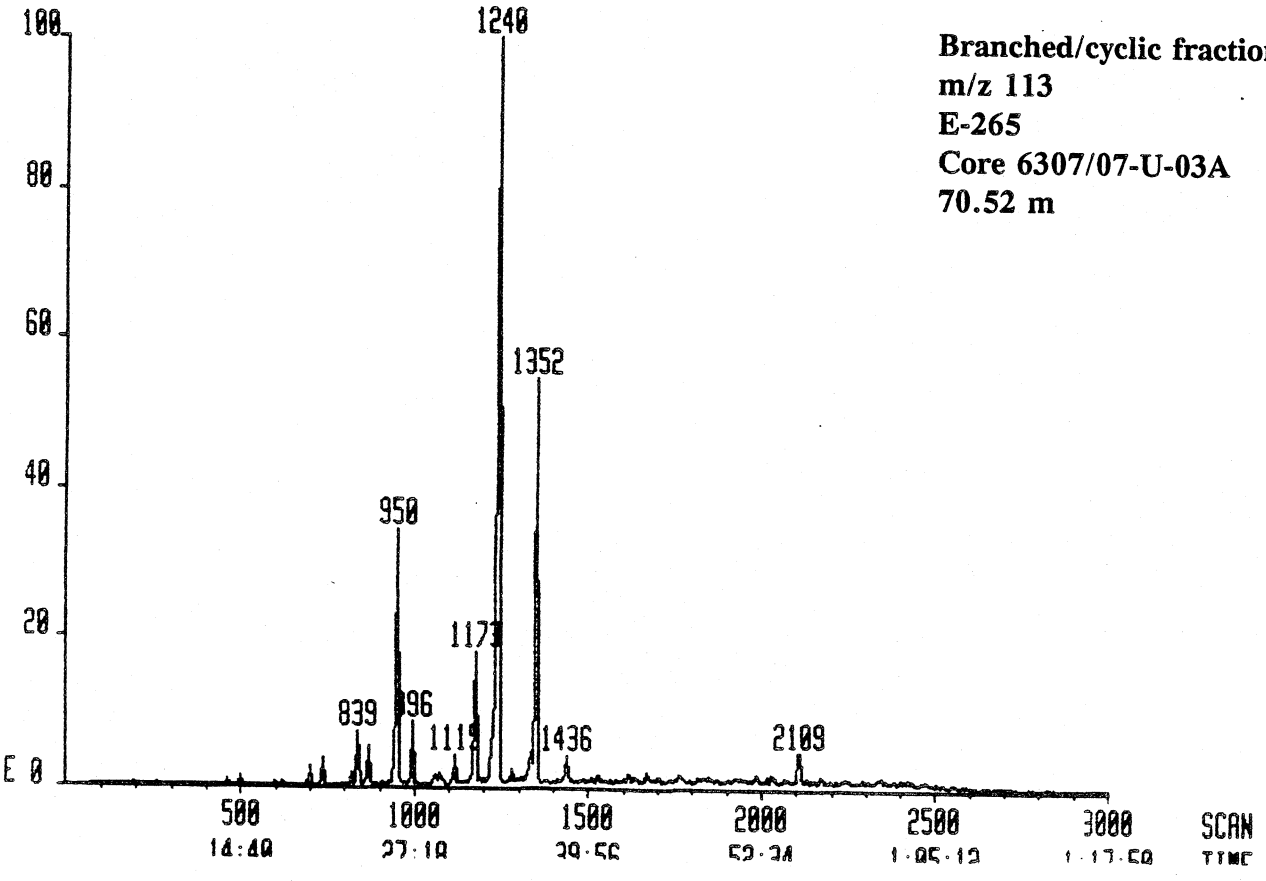
Branched/cyclic fractions
m/z 113
E-239
Core 6307/07-U-03A
55.26 m



Branched/cyclic fractions
m/z 113
E-249
Core 6307/07-U-03A
60.83 m



Branched/cyclic fractions
m/z 113
E-253
Core 6307/07-U-03A
62.83 m



Branched/cyclic fractions
m/z 113
E-265
Core 6307/07-U-03A
70.52 m

Figure III.5.5b

GC-MS

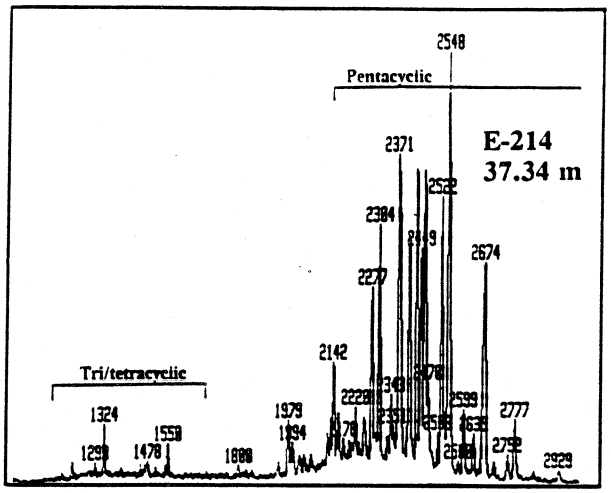
of

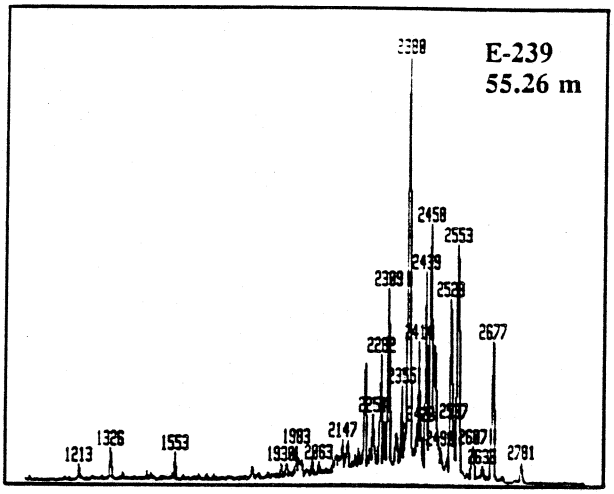
branched/cycloalkanes in extracts

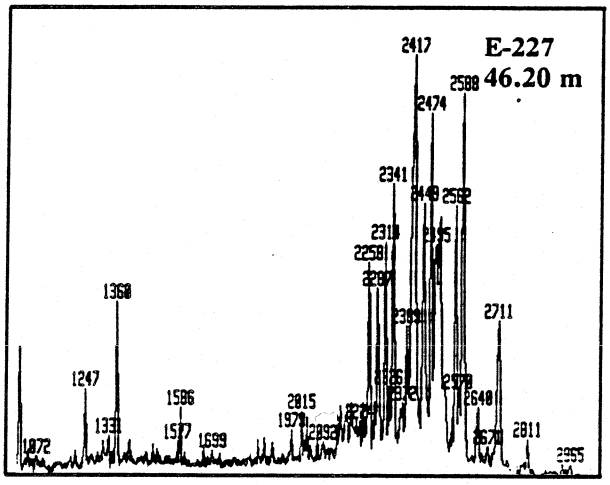
m/z 191

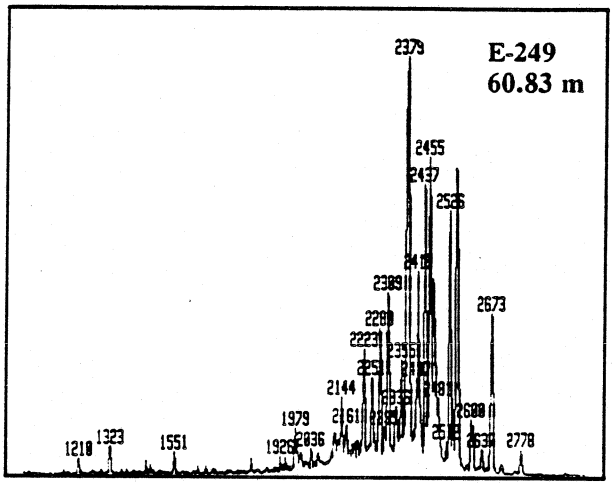
(Further identification of peaks, see section II)

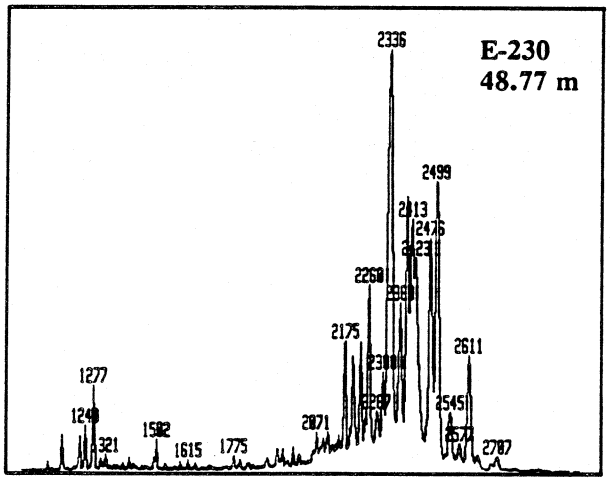
m/z 191 Terpanes/terpenes. Core 6307/07-U-03A

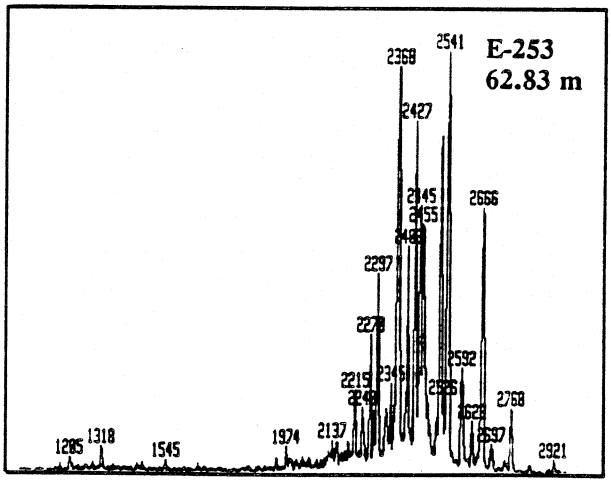


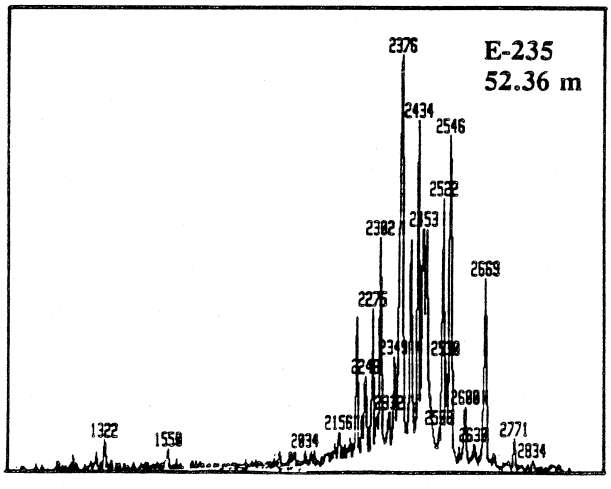


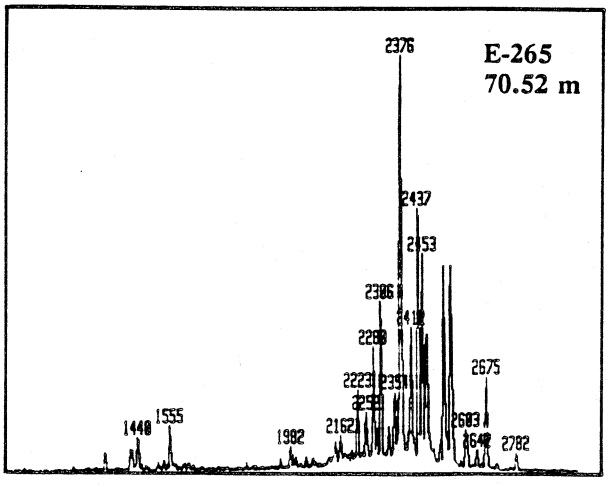


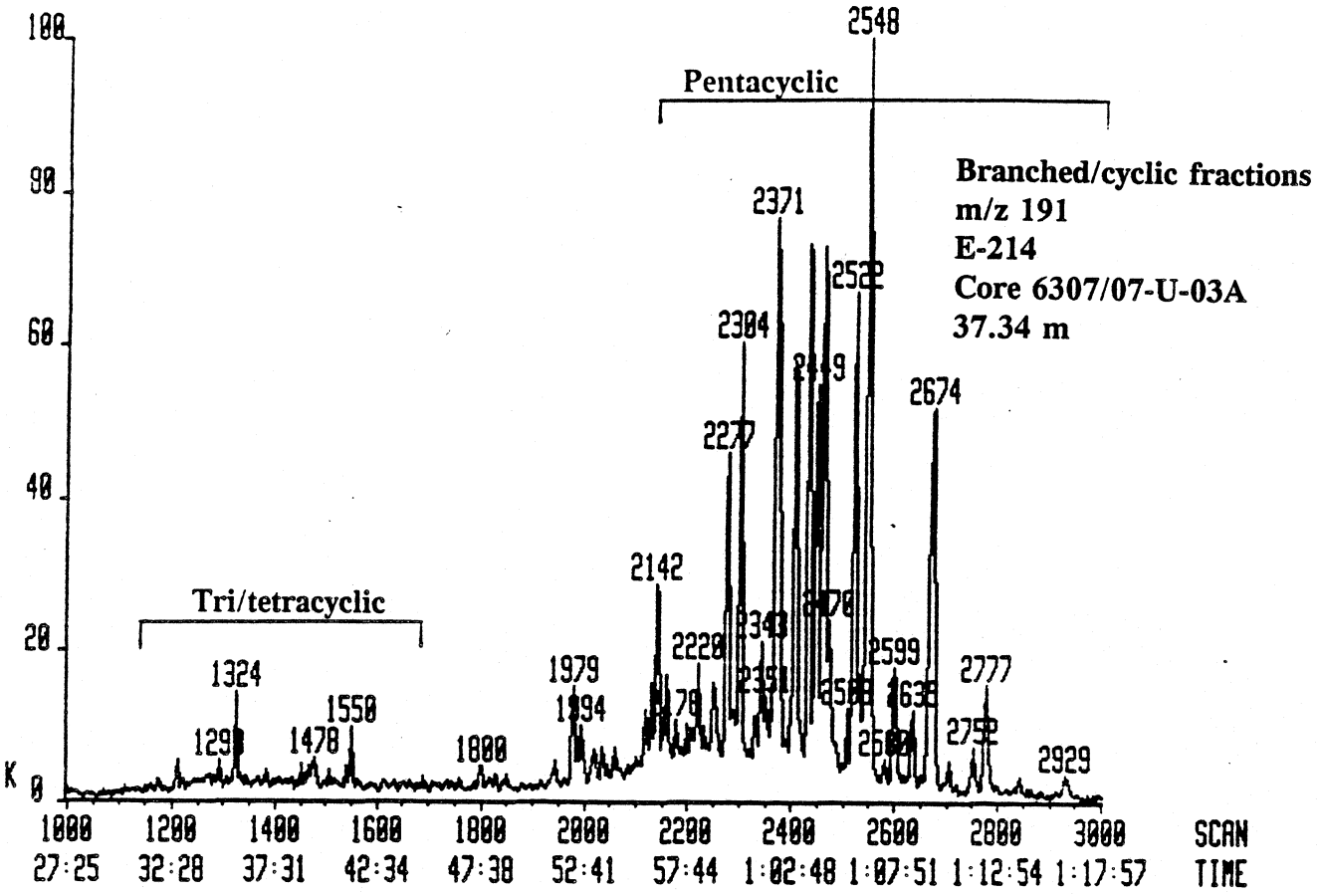


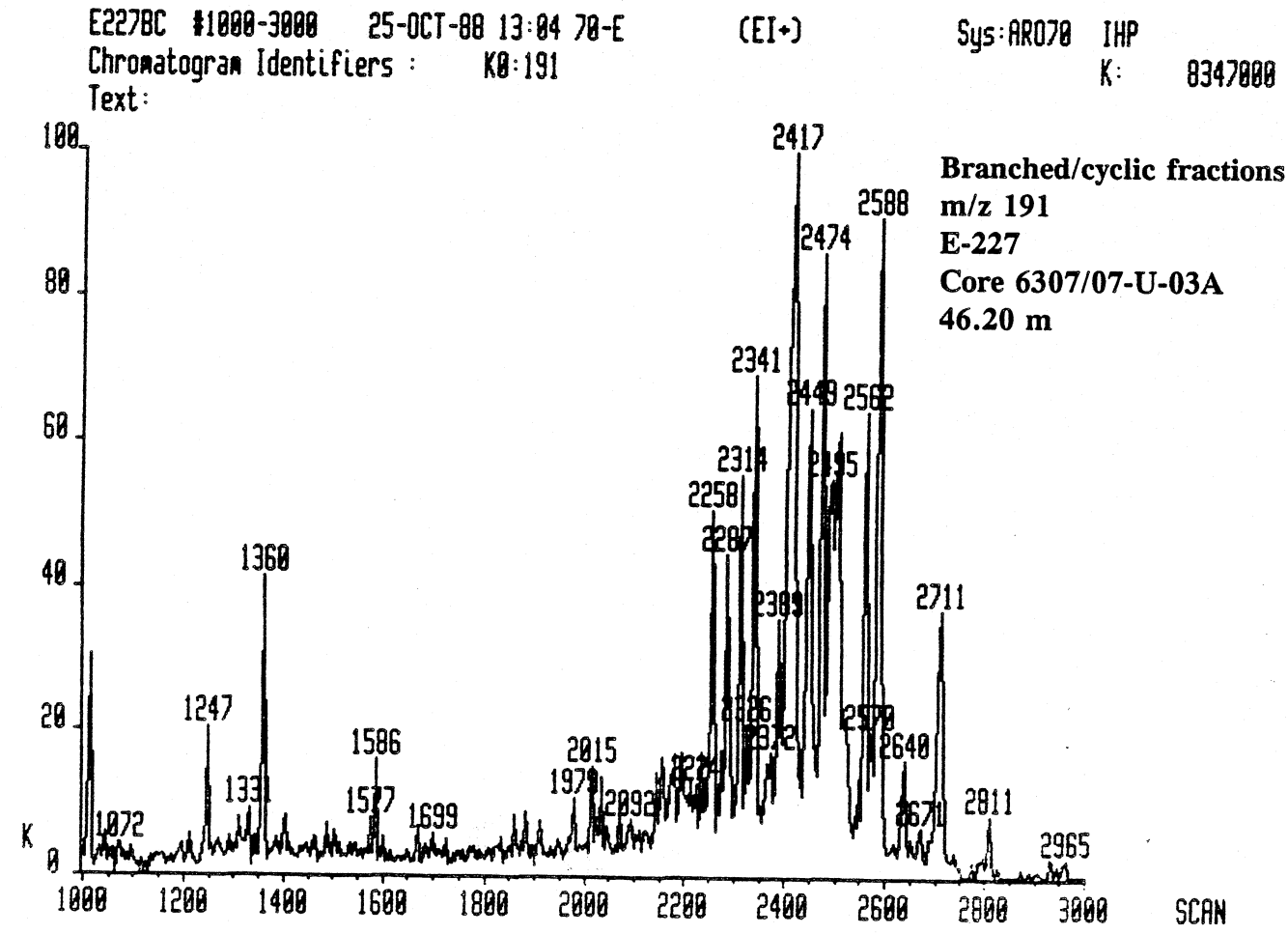


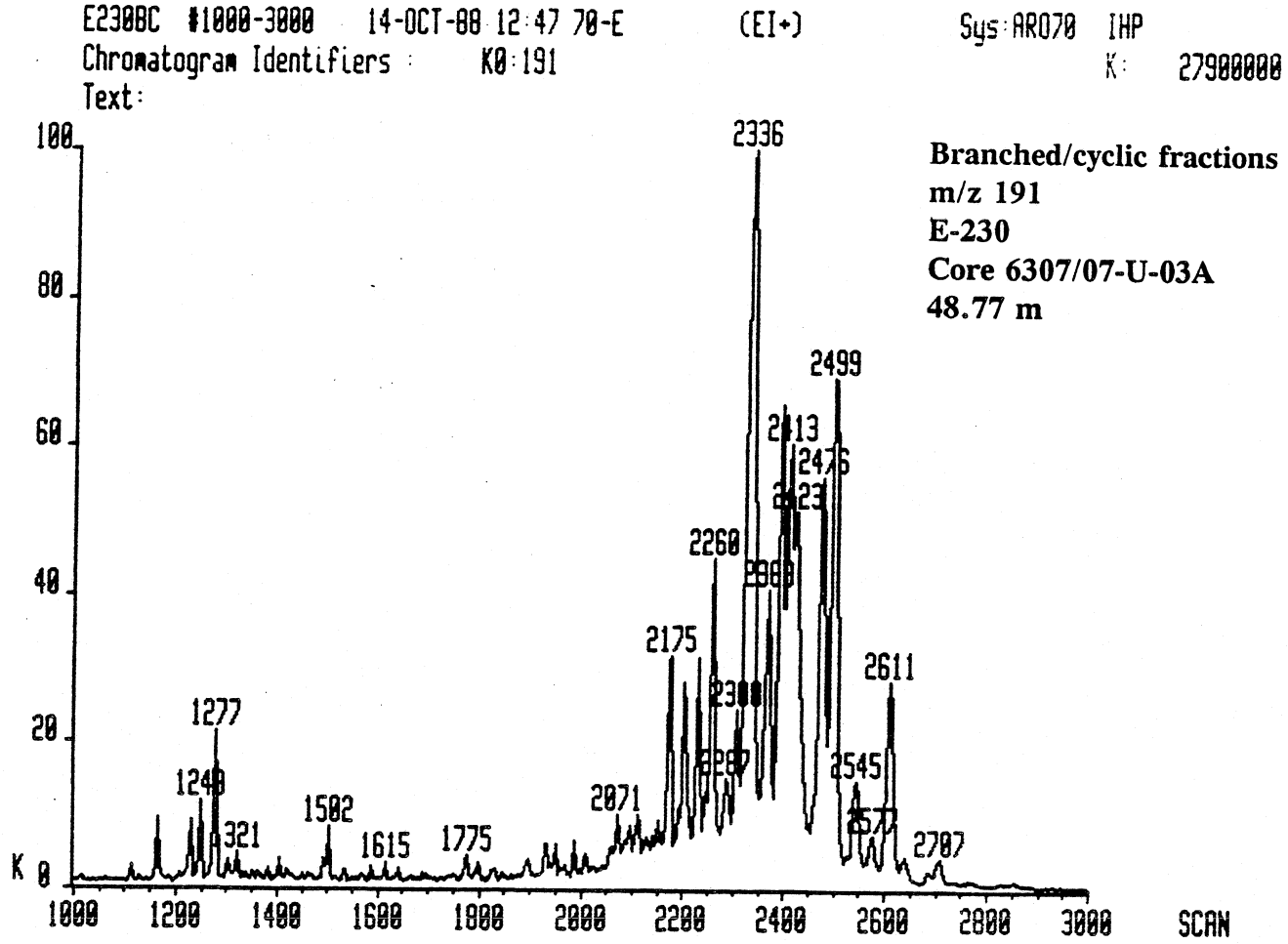


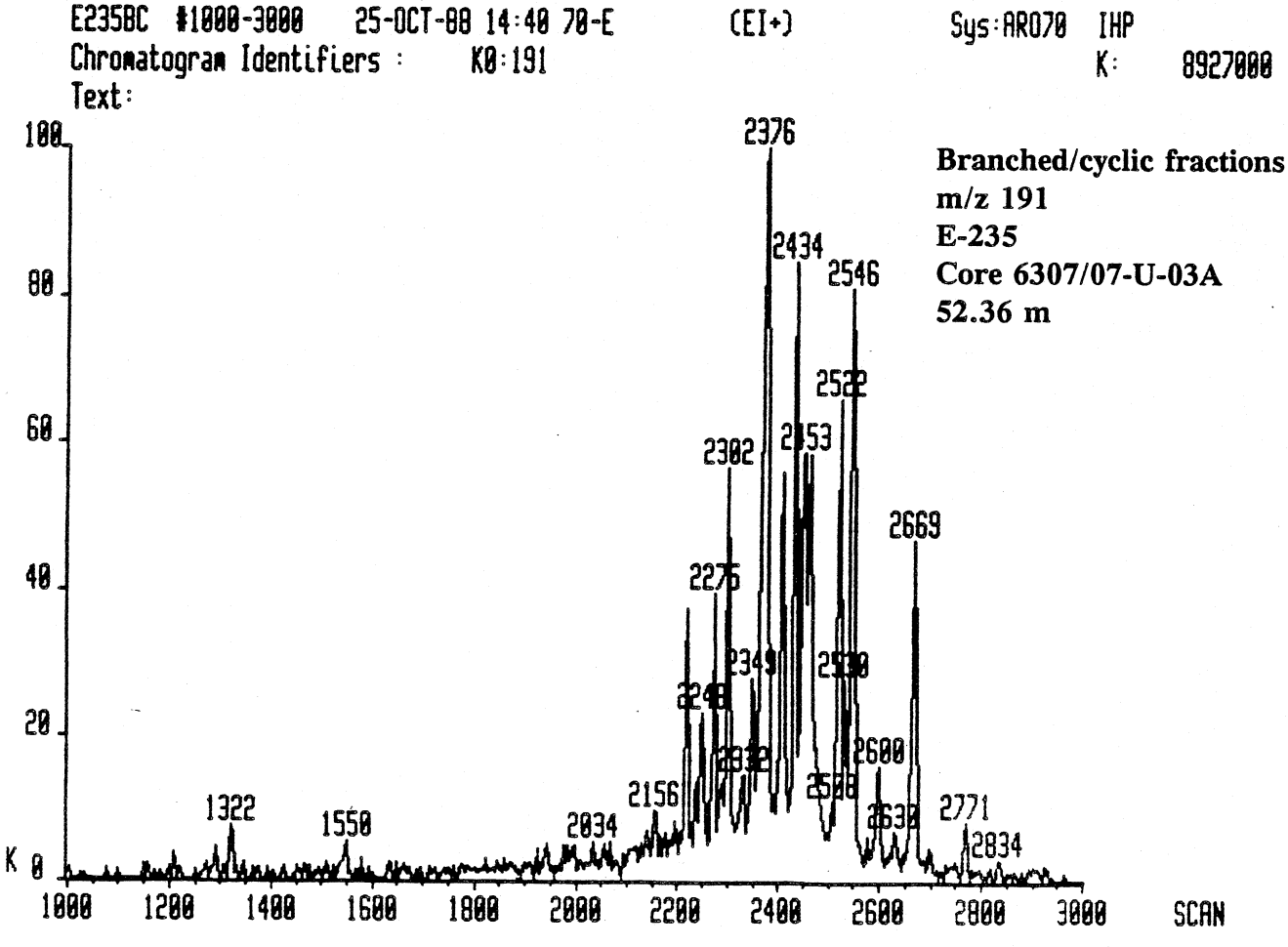


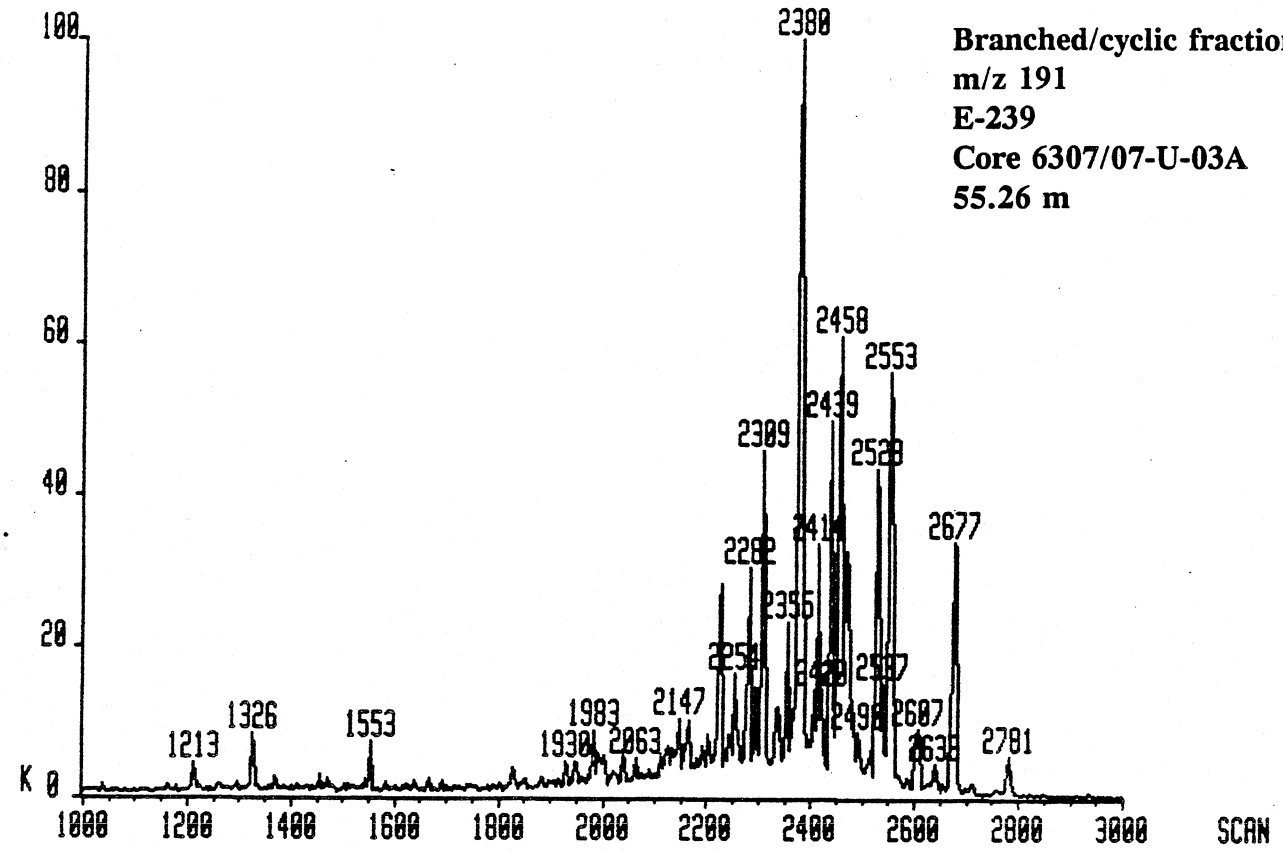


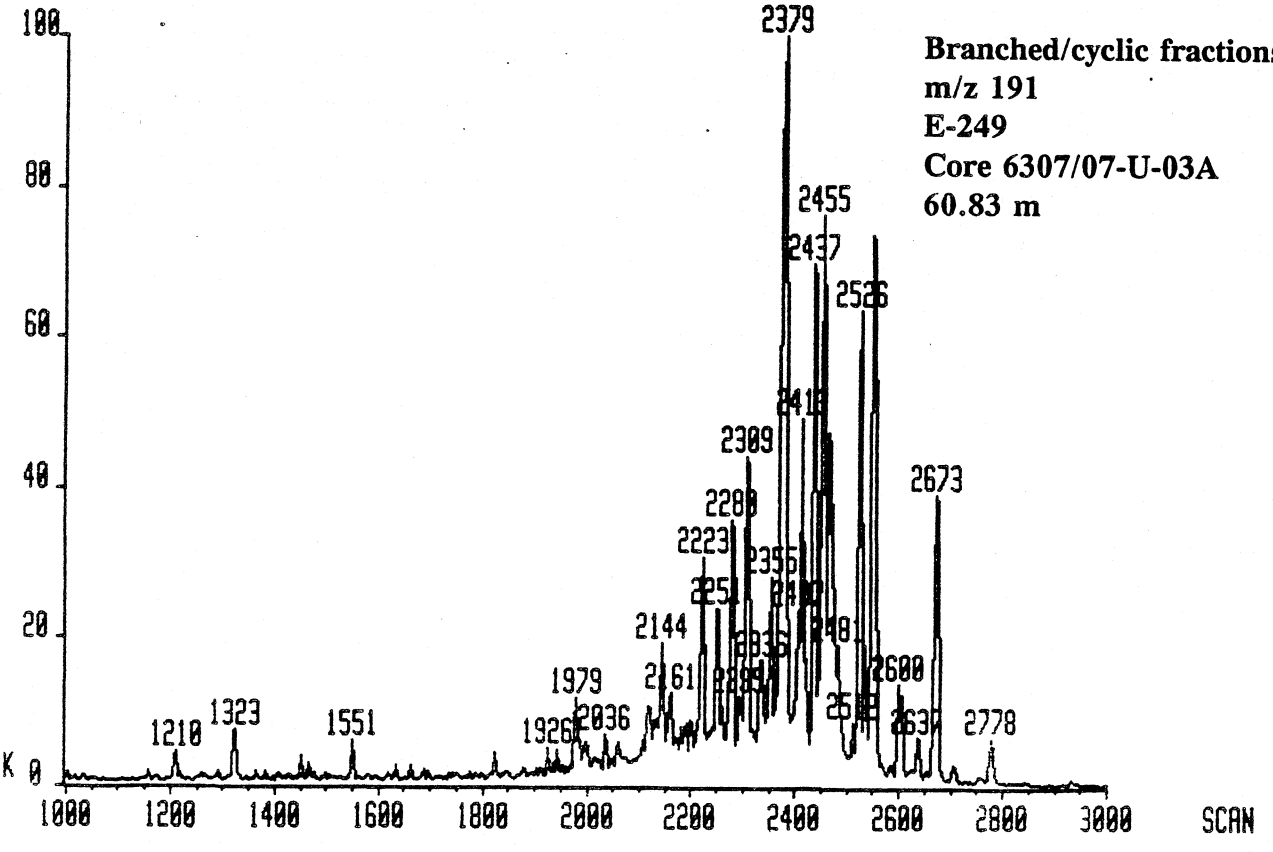

E214BC #1000-3000 26-OCT-88 12:27 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 20830000
Text:
Pentacyclic
Tri/tetracyclic
Branched/cyclic fractions
m/z 191
E-214
Core 6307/07-U-03A
37.34 m
SCAN
TIME

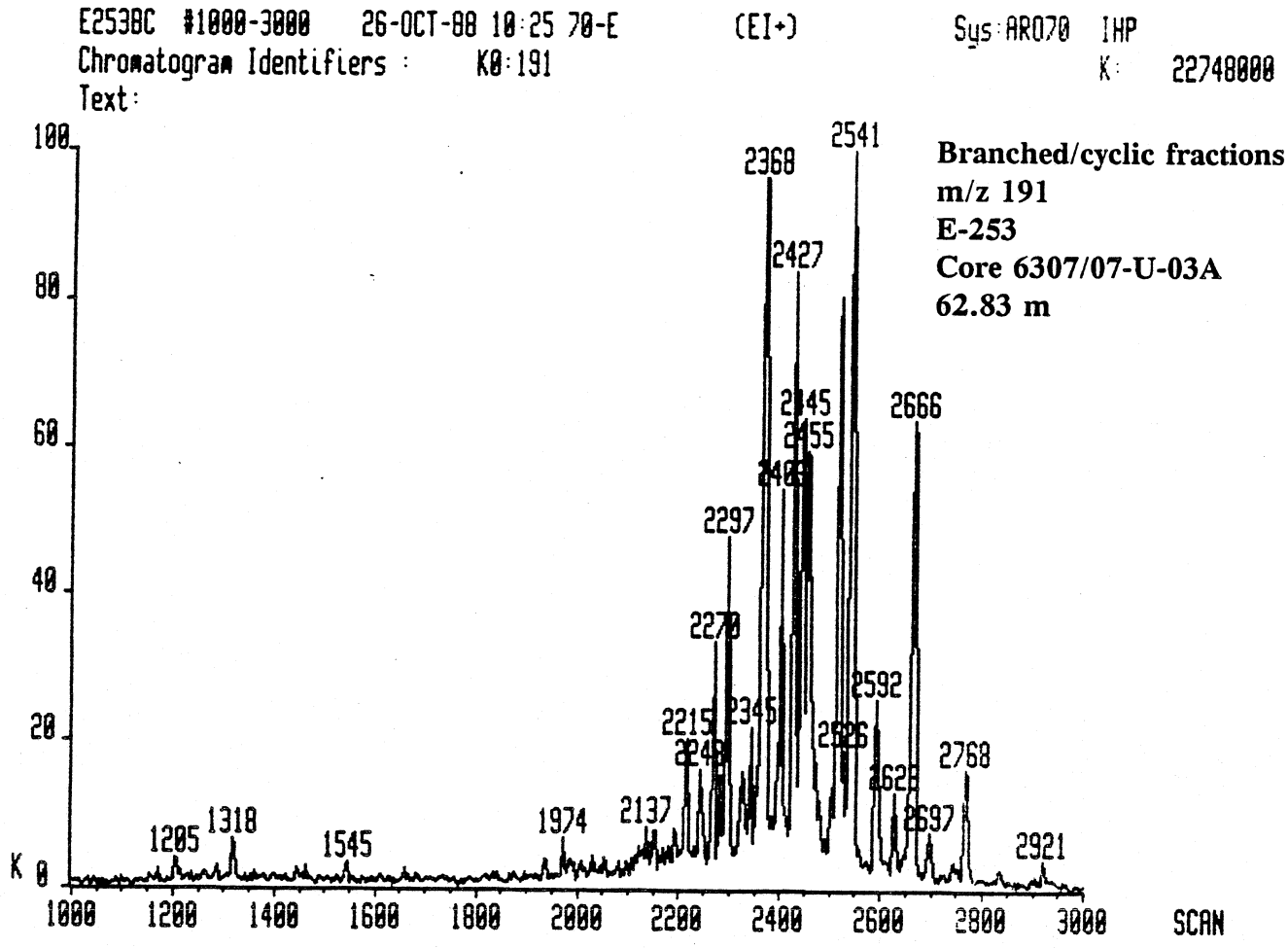

E227BC #1000-3000 25-OCT-88 13:04 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 8347000
Text:
Branched/cyclic fractions
m/z 191
E-227
Core 6307/07-U-03A
46.20 m
SCAN

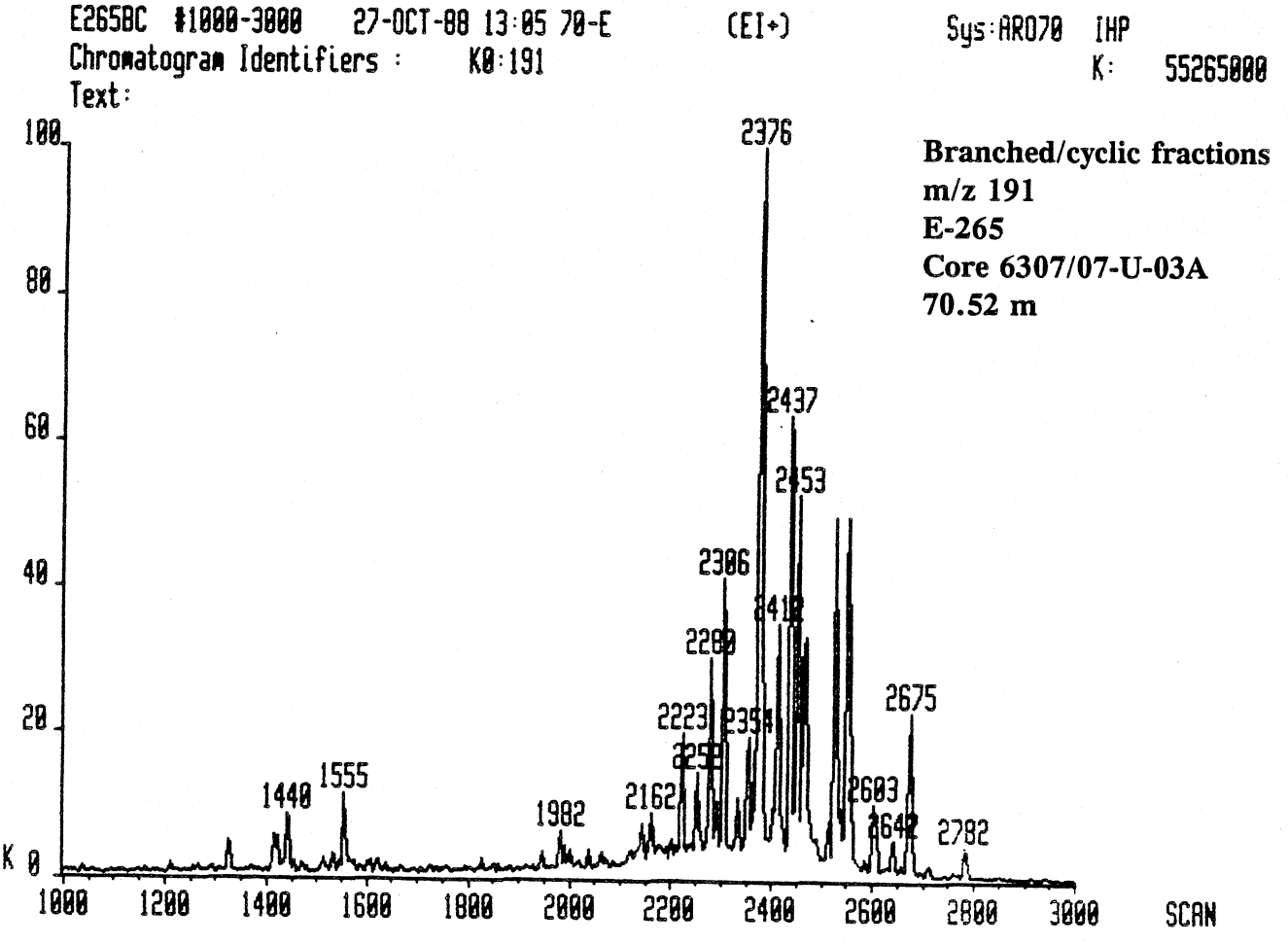

E230BC #1000-3000 14-OCT-88 12:47 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 27900000
Text:
100
80
60
40
20
K 0
1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 SCAN
2336
2499
2260
2175
2611
1277
1248
321
1582
1615
1775
2071
2545
2707
Branched/cyclic fractions
m/z 191
E-230
Core 6307/07-U-03A
48.77 m


E235BC #1000-3000 25-OCT-88 14:40 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 8927000
Text:
100
80
60
40
20
K 0
1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 SCAN
2376
2434
2546
2302
2669
2275
2600
1322
1550
2034
2156
2771
2834
Branched/cyclic fractions
m/z 191
E-235
Core 6307/07-U-03A
52.36 m


E239BC #1000-3000 28-OCT-88 14:02 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 43803000
Text:
Branched/cyclic fractions
m/z 191
E-239
Core 6307/07-U-03A
55.26 m
SCAN


E249BC #1000-3000 28-OCT-88 12:26 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 43673000
Text:
Branched/cyclic fractions
m/z 191
E-249
Core 6307/07-U-03A
60.83 m
SCAN


E253BC #1000-3000 26-OCT-88 10:25 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 22748000
Text:
100
80
60
40
20
K 0
1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 SCAN
1205 1318 1545 1974 2137 2215 2297 2368 2427 2541 2666 2768 2921
Branched/cyclic fractions
m/z 191
E-253
Core 6307/07-U-03A
62.83 m


E265BC #1000-3000 27-OCT-88 13:05 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 55265000
Text:
100
80
60
40
20
K 0
1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 SCAN
1440 1555 1982 2162 2223 2306 2376 2437 2453 2675 2782
Branched/cyclic fractions
m/z 191
E-265
Core 6307/07-U-03A
70.52 m

IKU SINTEF-GRUPPEN

Figure III.5.5c

GC-MS

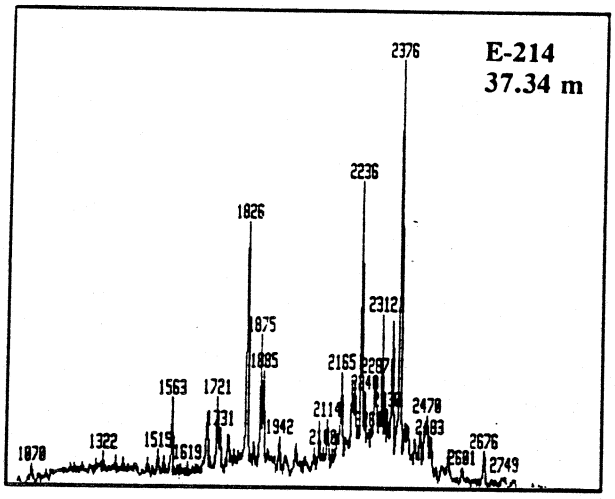
of

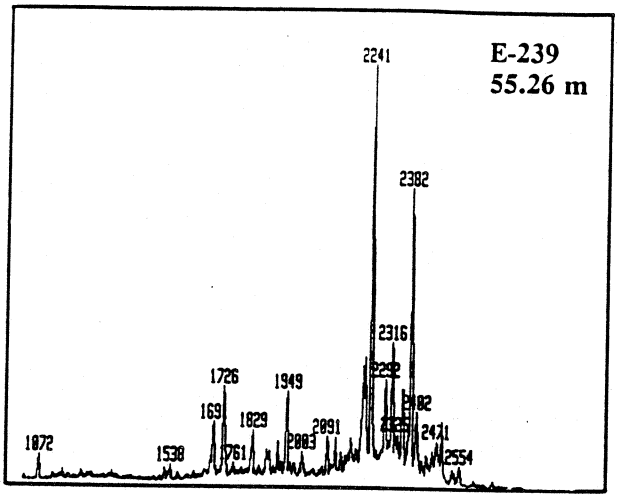
branched/cycloalkanes in extracts

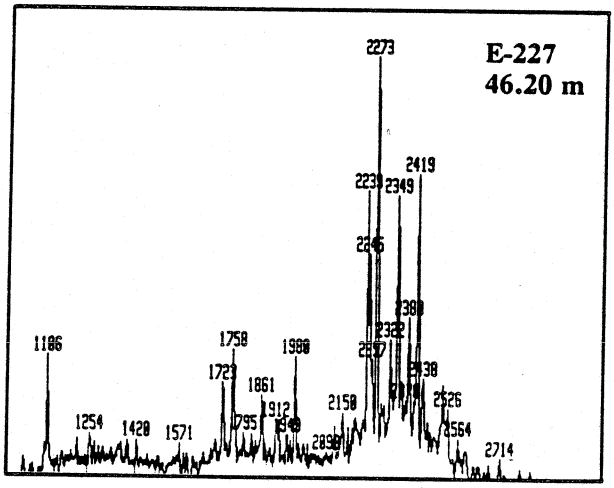
m/z 217

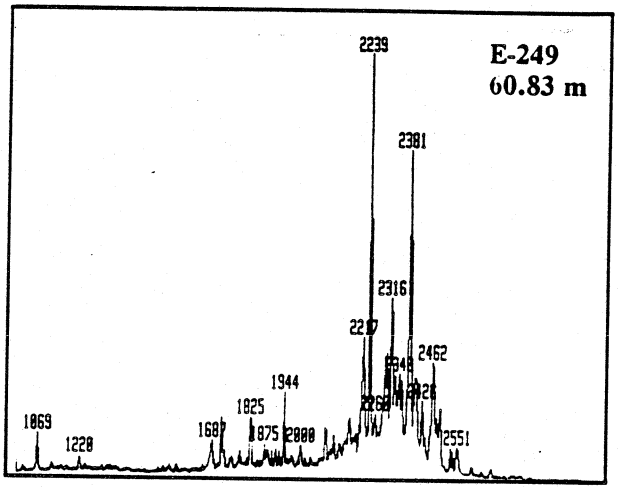
(Further identification of peaks, see section II)

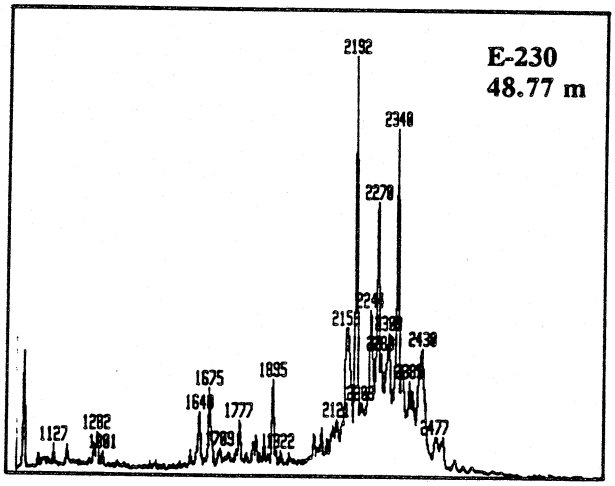
m/z 217 Steranes. Core 6307/07-U-03A

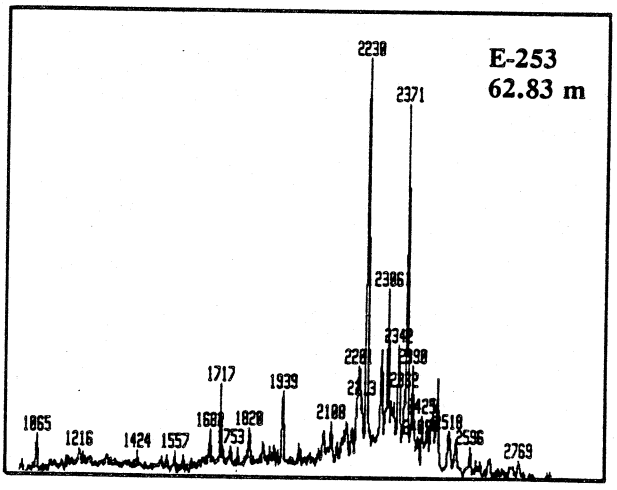


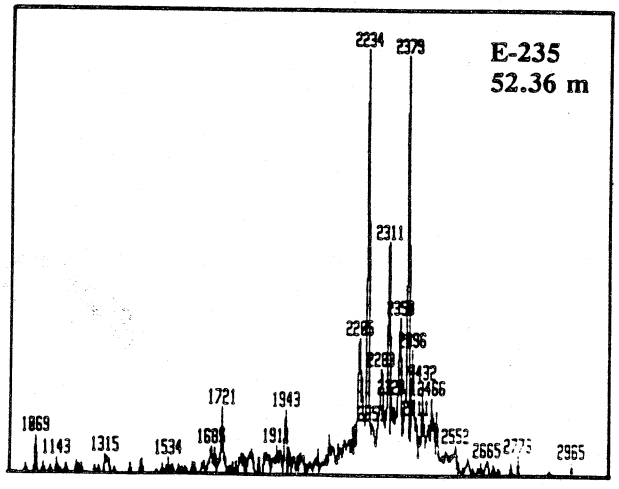


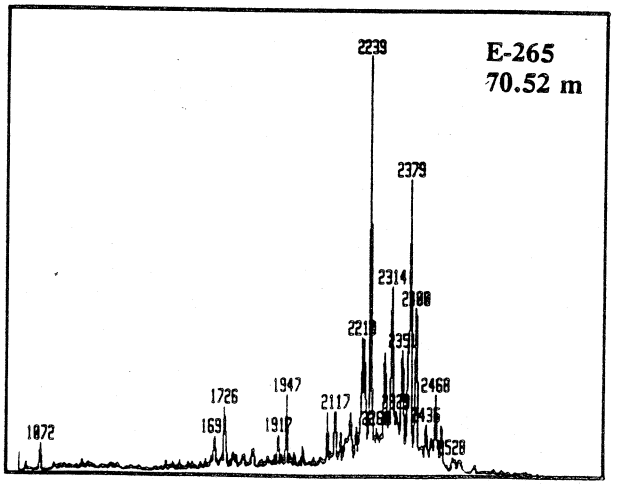


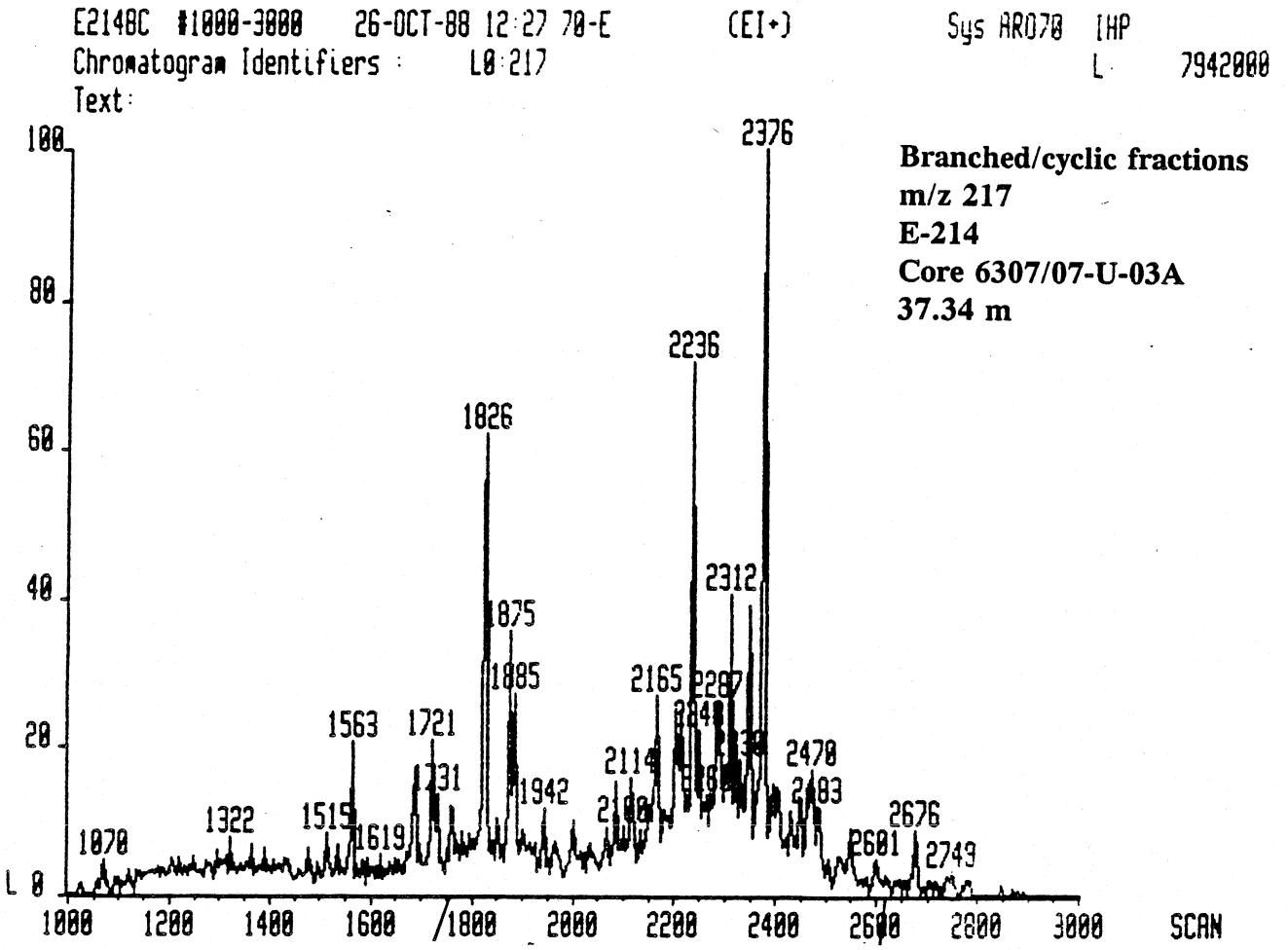


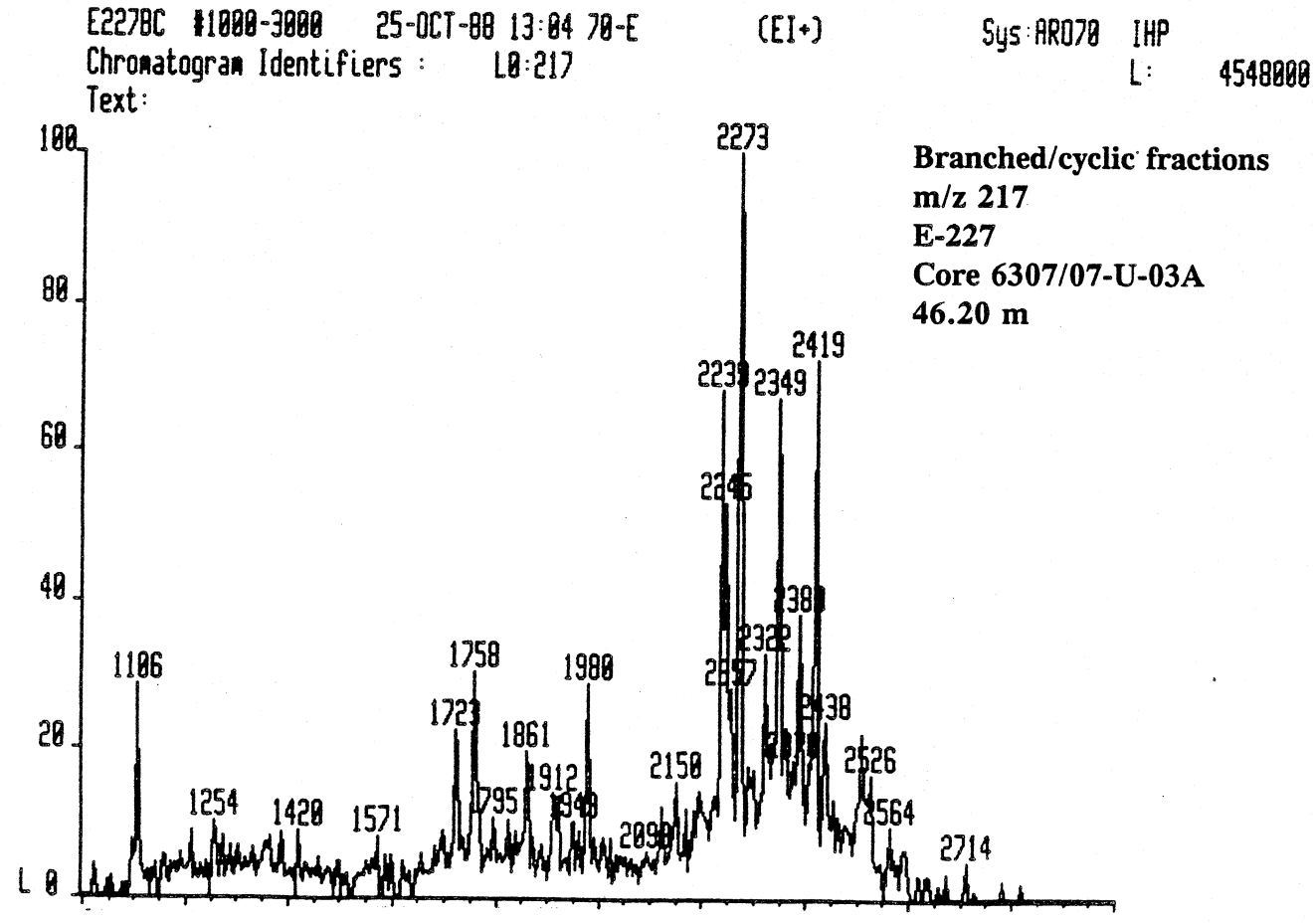


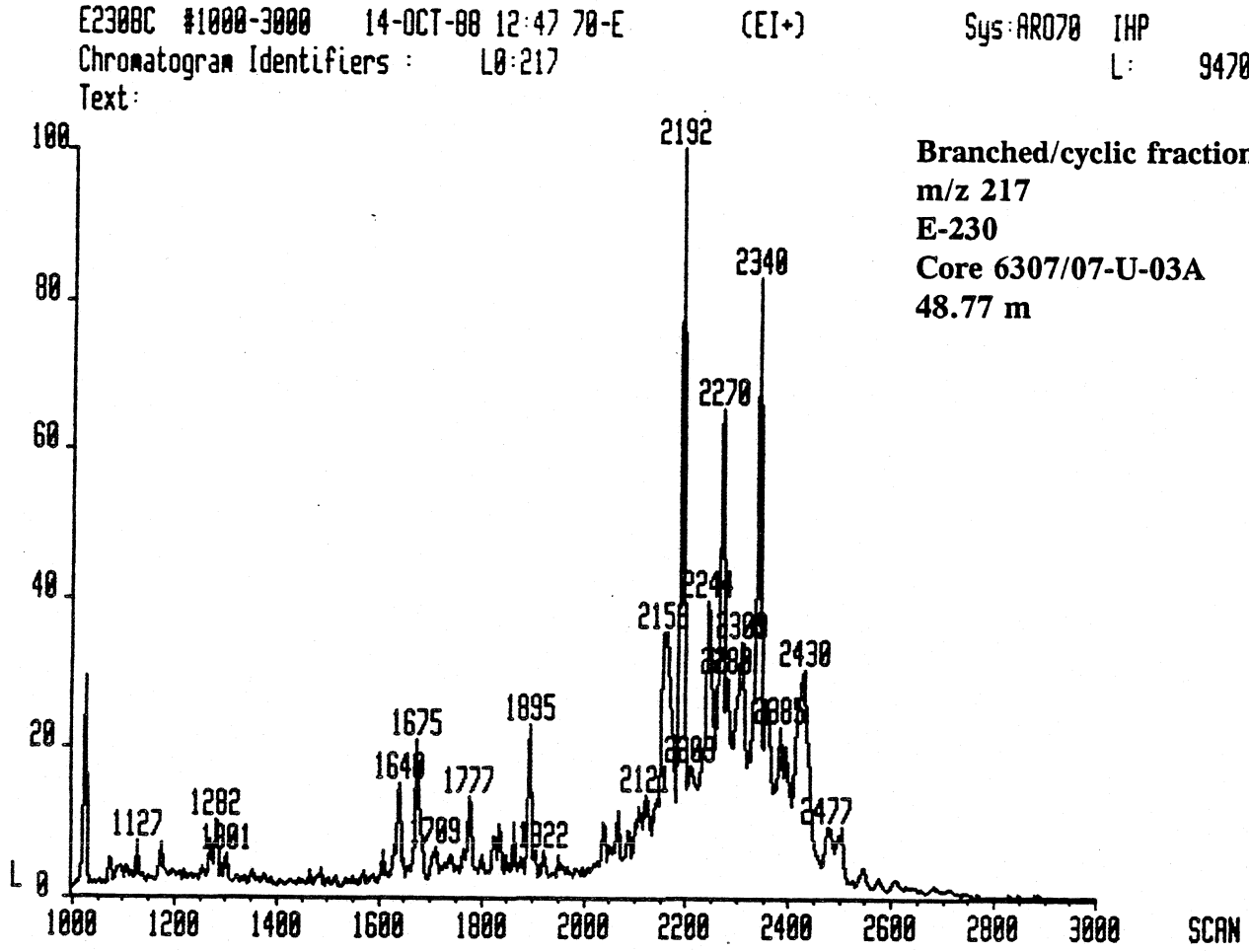


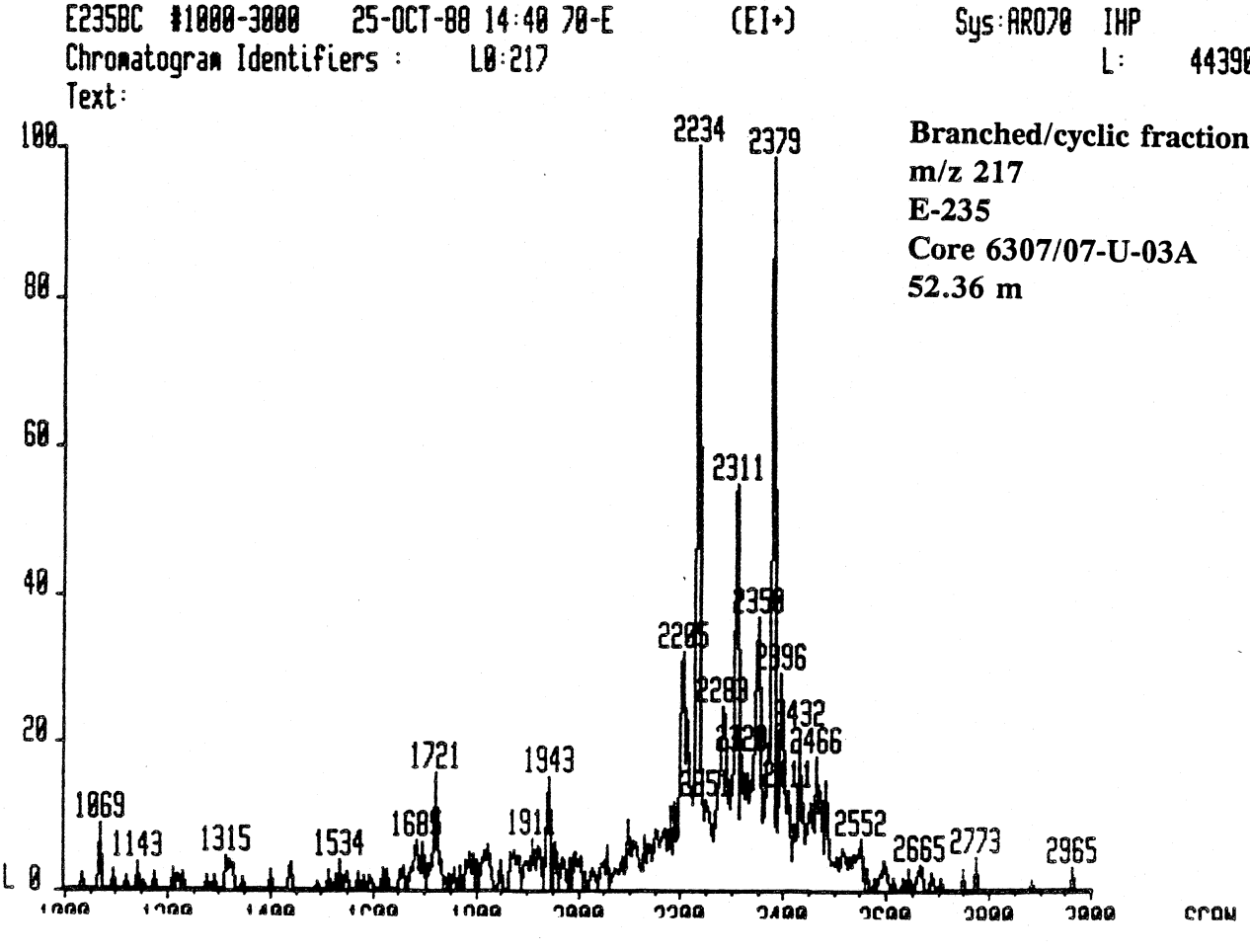


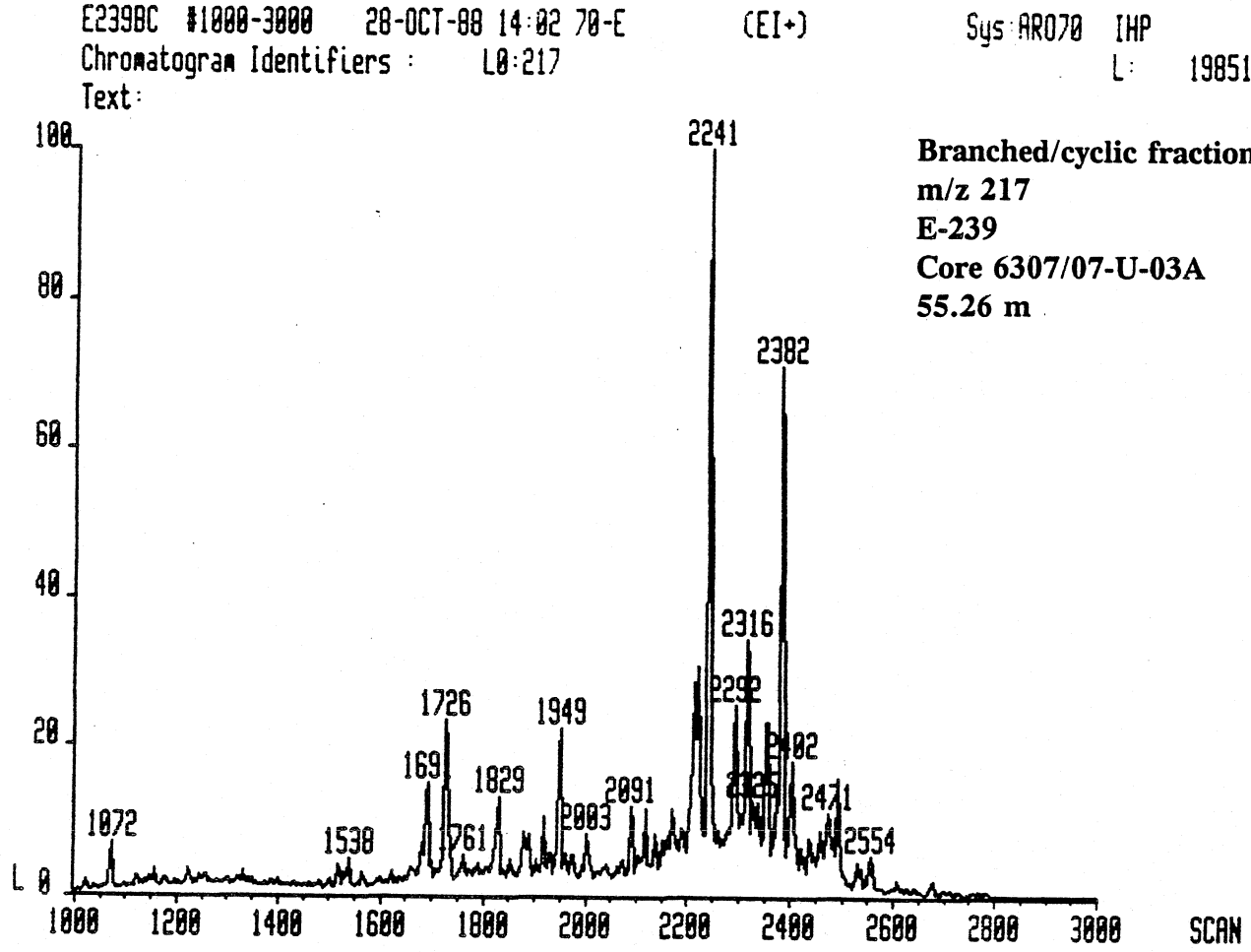



E2148C #1000-3000 26-OCT-88 12:27 70-E (EI+) Sys AR070 IHP
Chromatogram Identifiers : L0:217 L: 7942000
Text:
100
80
60
40
20
L 0
1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 SCAN
2376
2236
1826
2312
1875
1885
2165
1563
1721
2470
1942
2676
1322
1515
1619
1070
2601
2749
Branched/cyclic fractions
m/z 217
E-214
Core 6307/07-U-03A
37.34 m

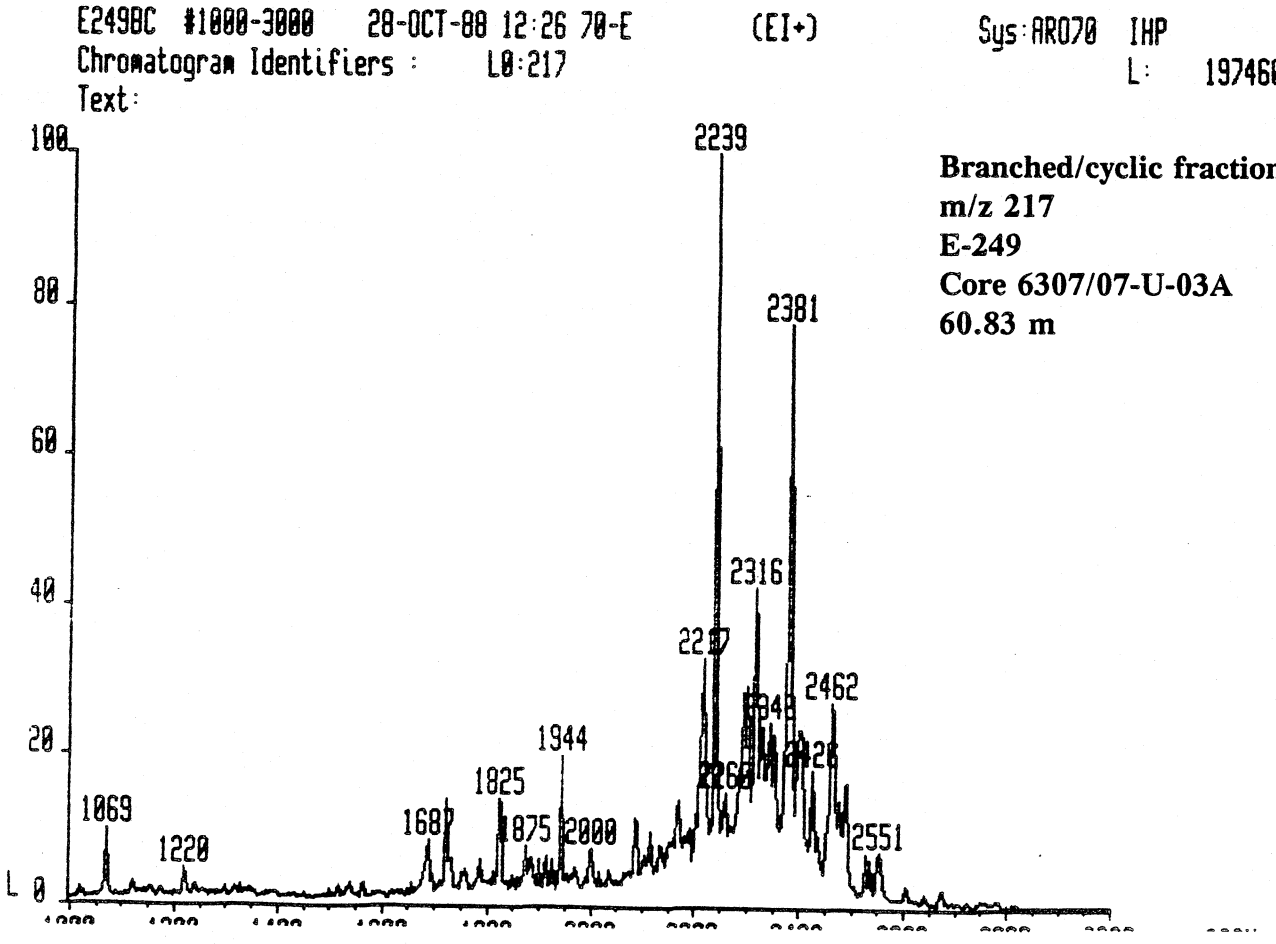

E2278C #1000-3000 25-OCT-88 13:04 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : L0:217 L: 4548000
Text:
100
80
60
40
20
L 0
2273
2419
2349
1106
1758
1980
1861
2150
1254
1420
1571
2526
2564
2714
Branched/cyclic fractions
m/z 217
E-227
Core 6307/07-U-03A
46.20 m


E2308C #1000-3000 14-OCT-88 12:47 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : L0:217 L: 9470000
Text:
100
80
60
40
20
L 0
1000 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 SCAN
2192
2340
2270
2430
1675
1895
1777
1282
1127
2121
2477
Branched/cyclic fractions
m/z 217
E-230
Core 6307/07-U-03A
48.77 m

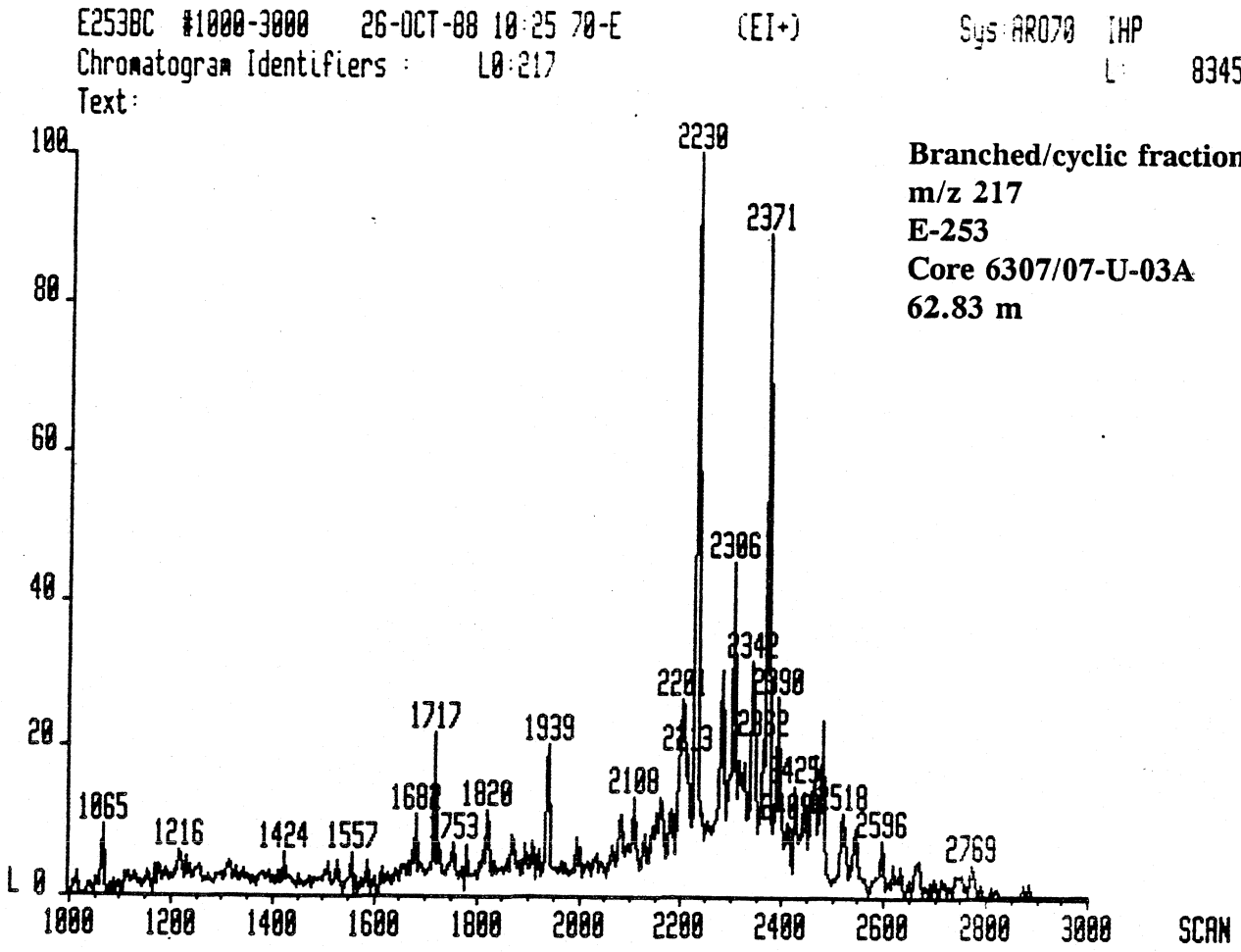

E235BC #1000-3000 25-OCT-88 14:40 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : L0:217 L: 4439000
Text:
100
80
60
40
20
L 0
2234
2379
2311
1721
1943
1869
1143
1315
1534
2552
2665
2773
2965
Branched/cyclic fractions
m/z 217
E-235
Core 6307/07-U-03A
52.36 m



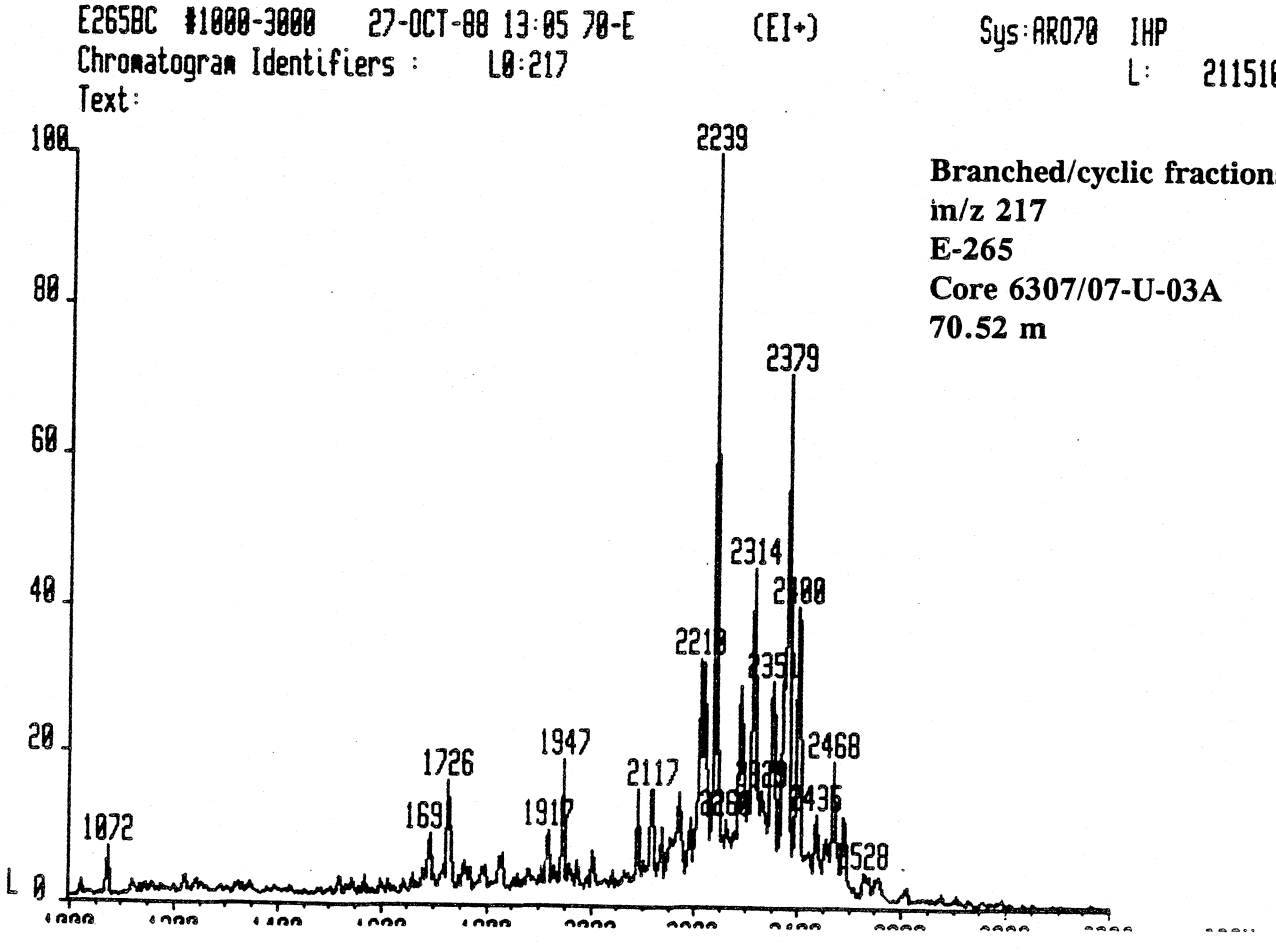
Branched/cyclic fractions
m/z 217
E-239
Core 6307/07-U-03A
55.26 m



Branched/cyclic fractions
m/z 217
E-249
Core 6307/07-U-03A
60.83 m



Branched/cyclic fractions
m/z 217
E-253
Core 6307/07-U-03A
62.83 m



Branched/cyclic fractions
m/z 217
E-265
Core 6307/07-U-03A
70.52 m

IKU SINTEF-GRUPPEN

Figure III.5.5d

GC-MS

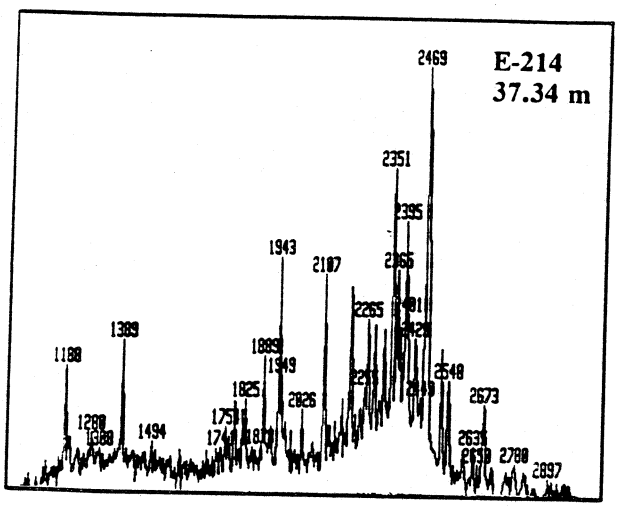
of

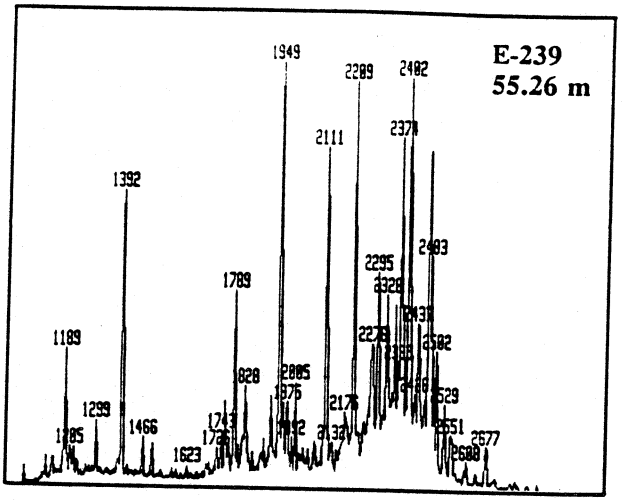
branched/cycloalkanes in extracts

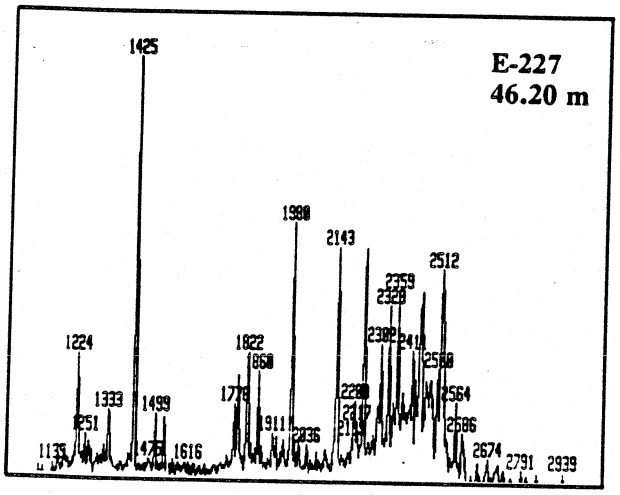
m/z 231

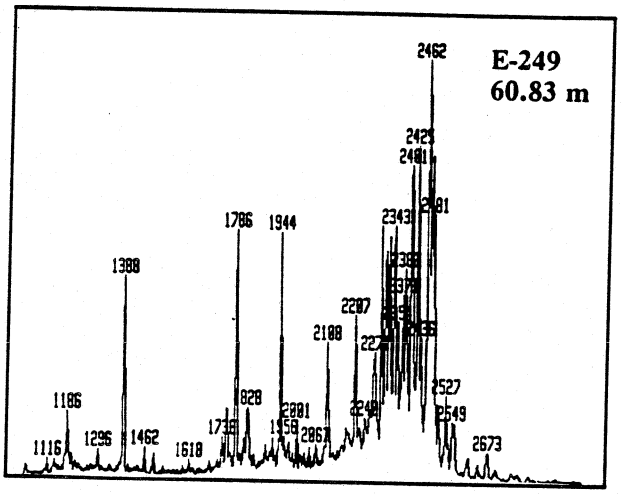
(Further identification of peaks, see section II)

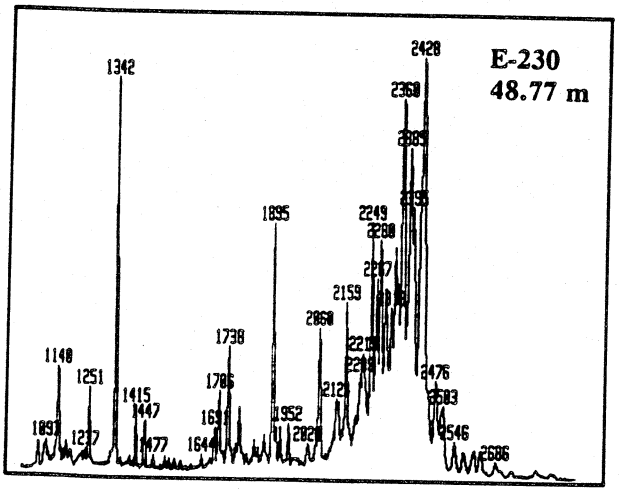
m/z 231 4-methyl steranes /$\Delta^{17(21)}$-hopenes. Core 6307/07-U-03A

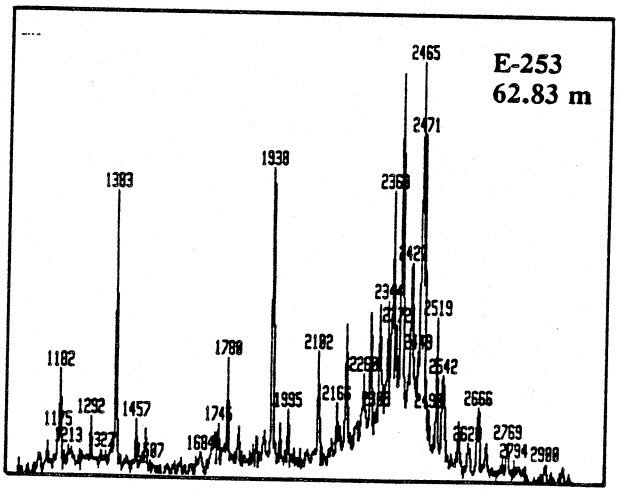


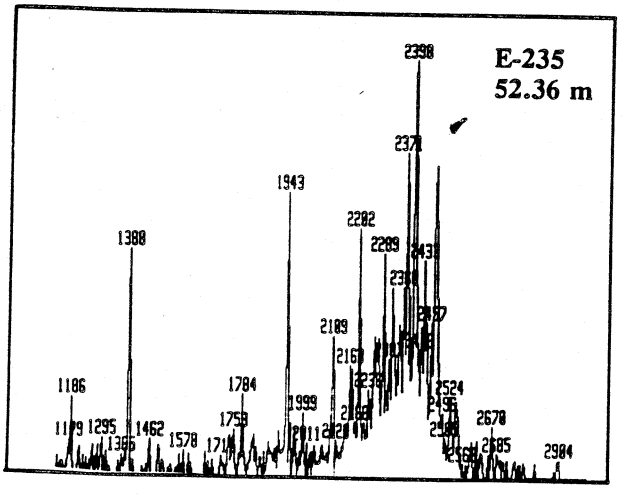


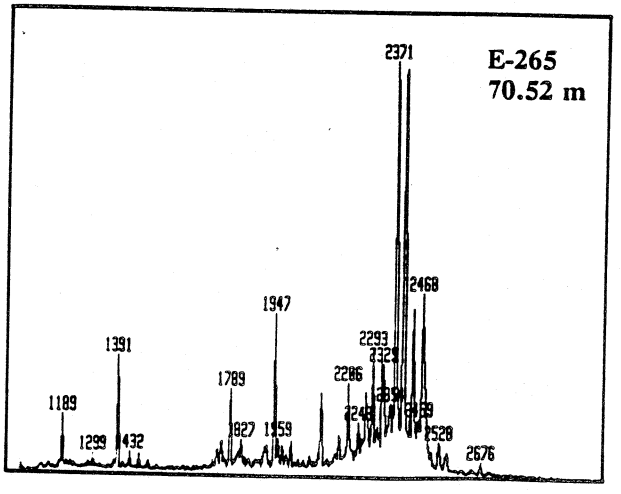


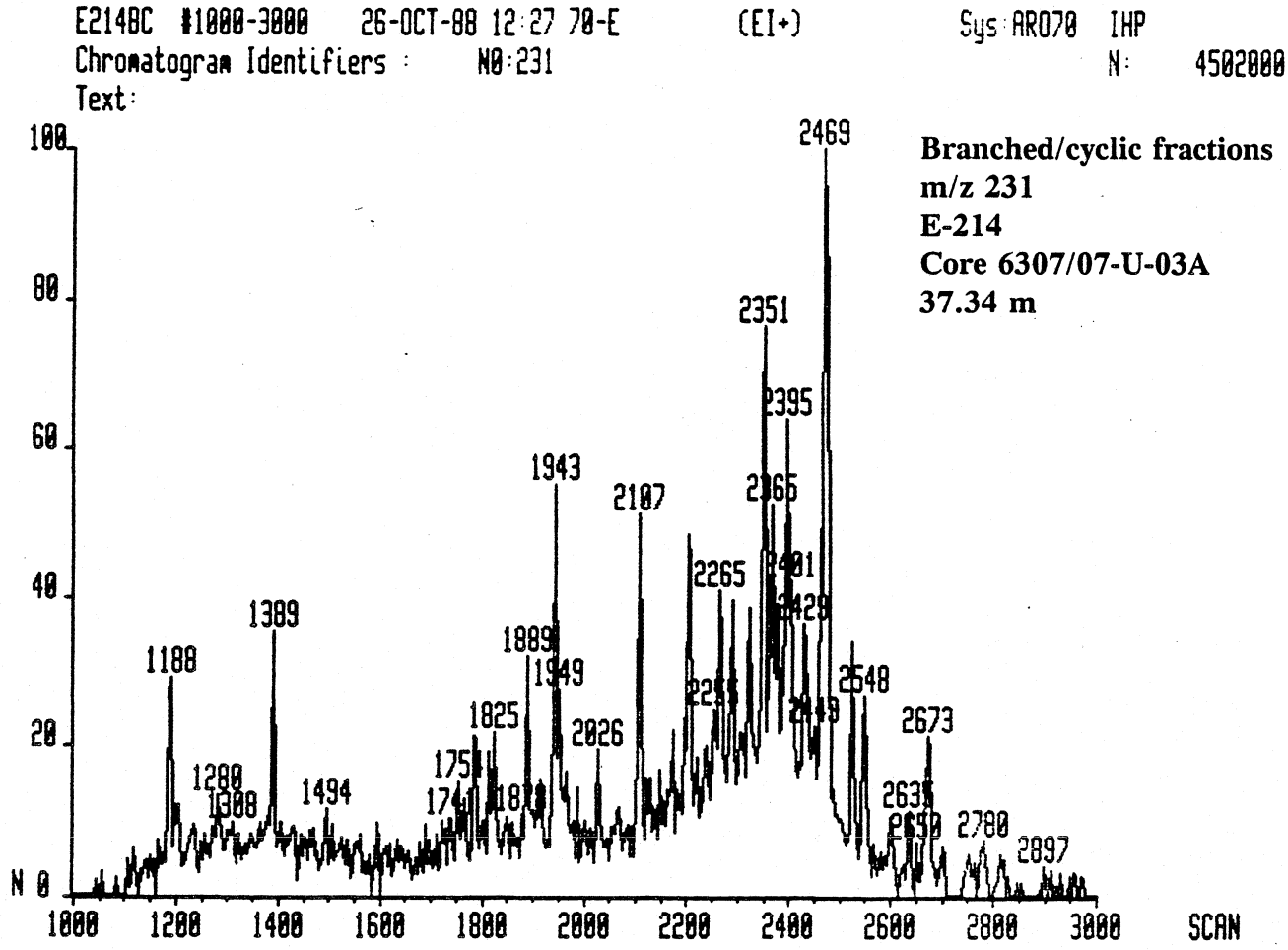




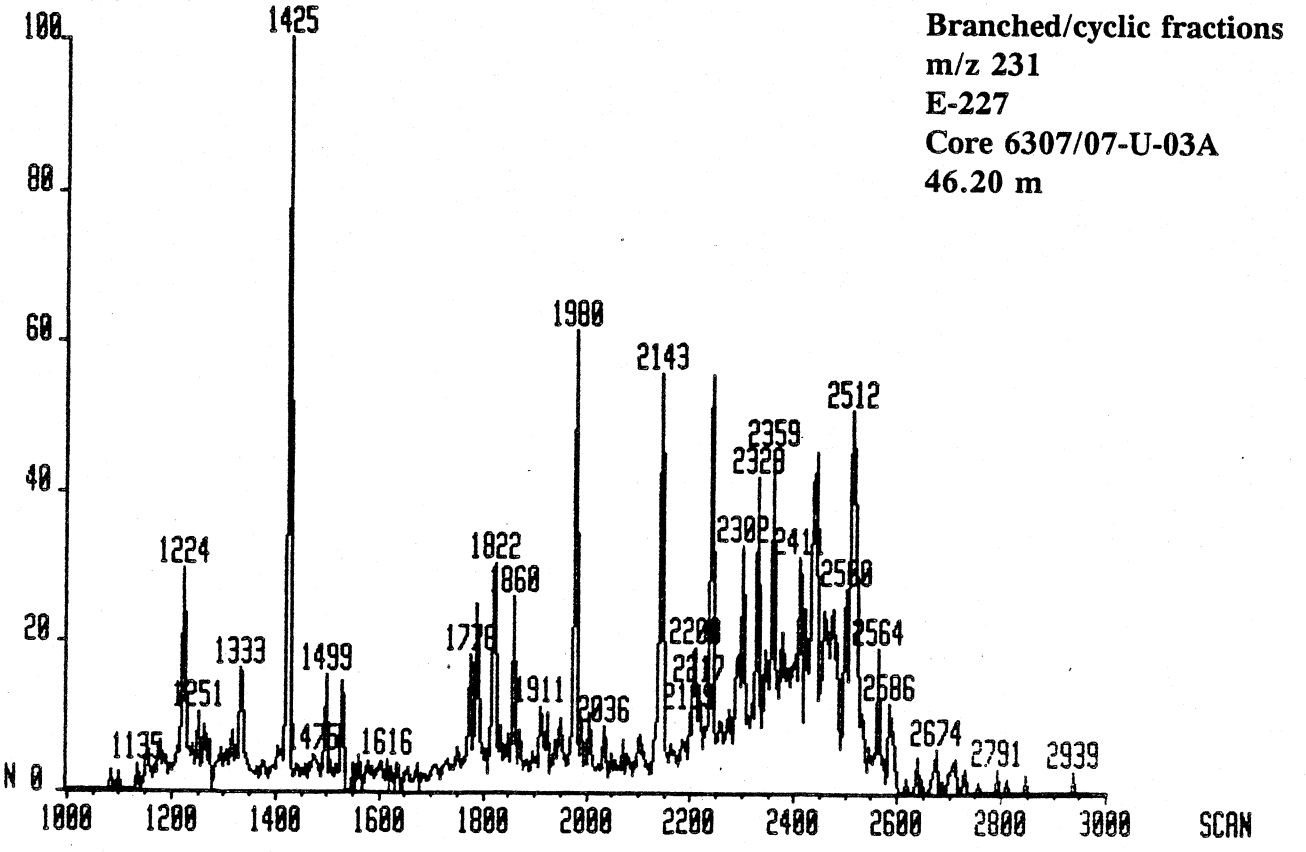




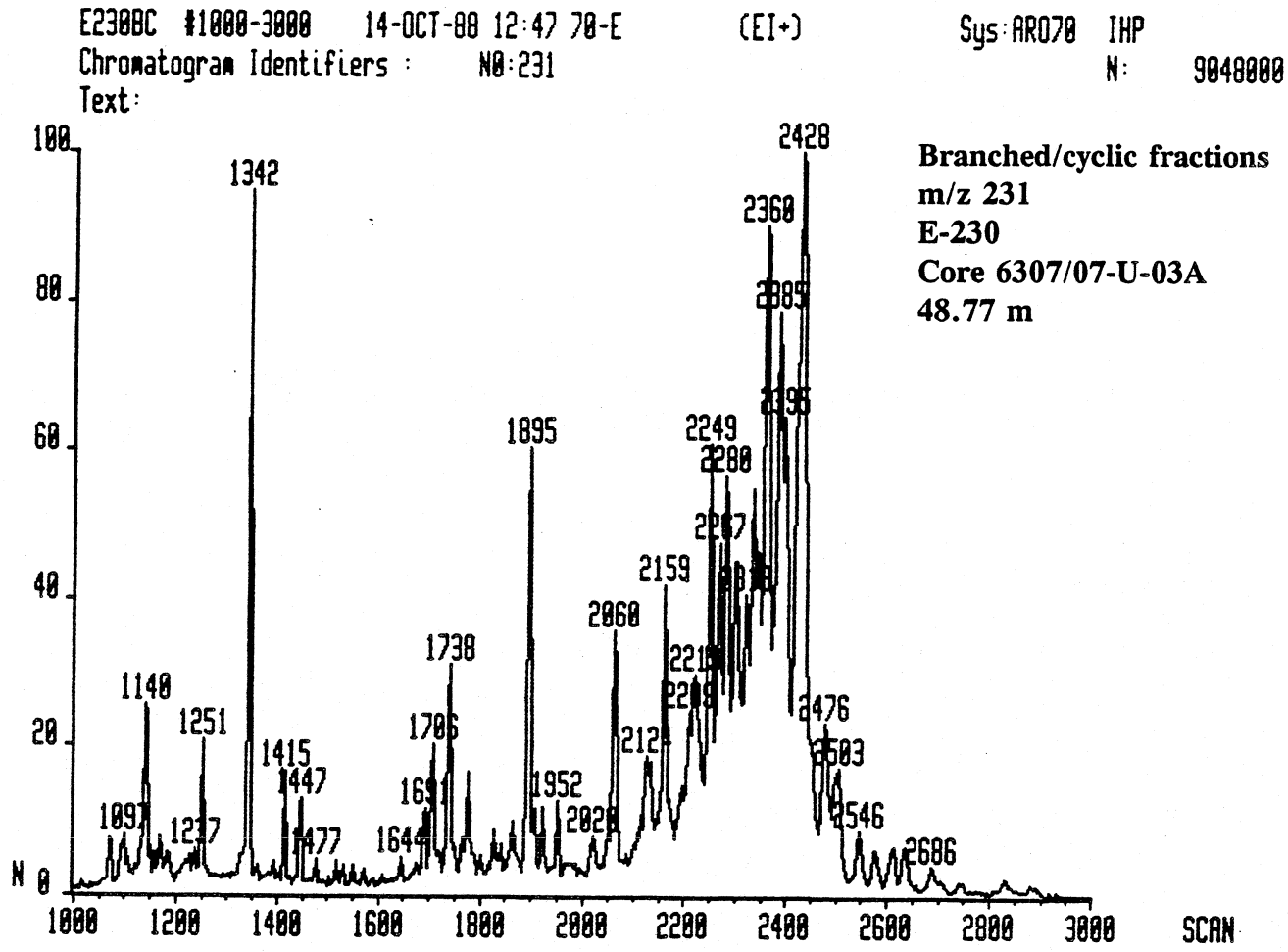


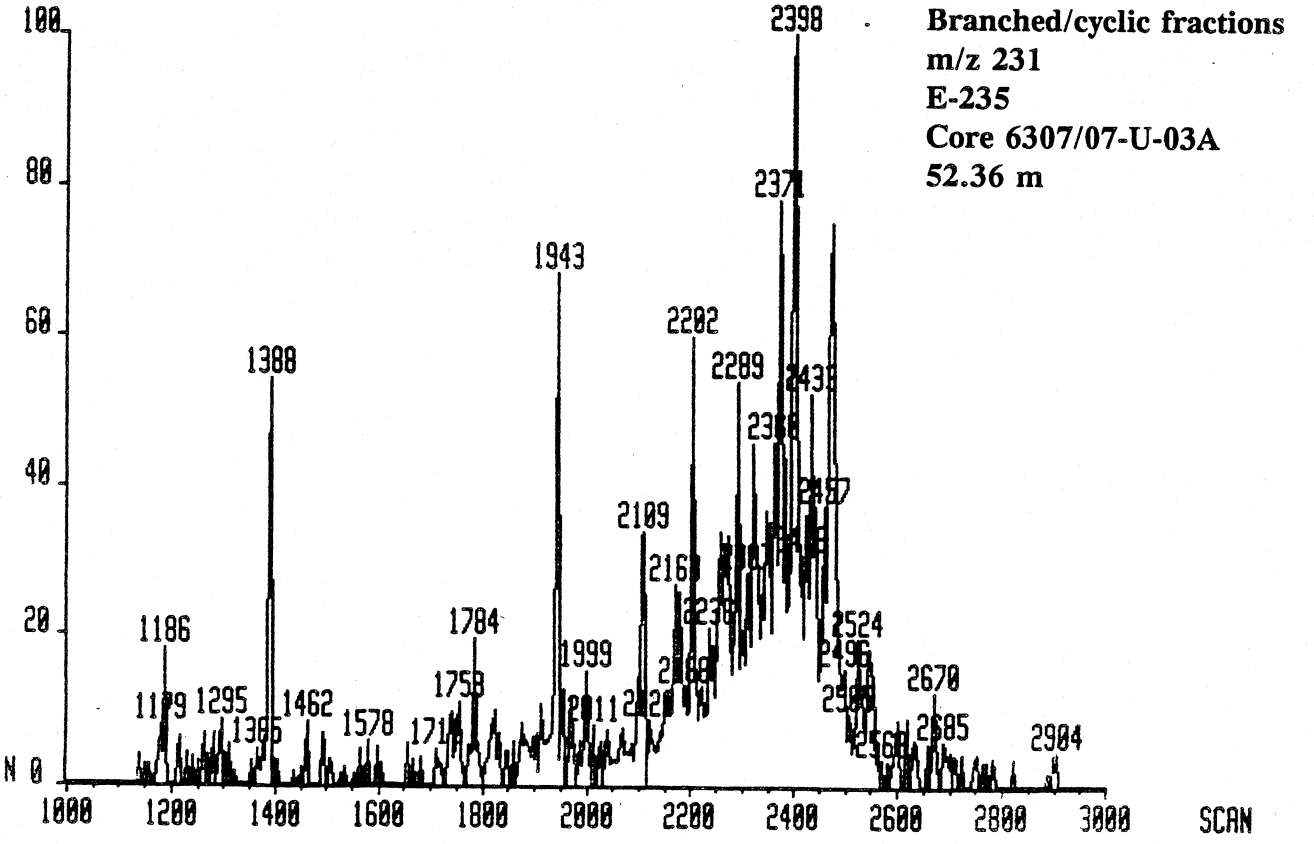


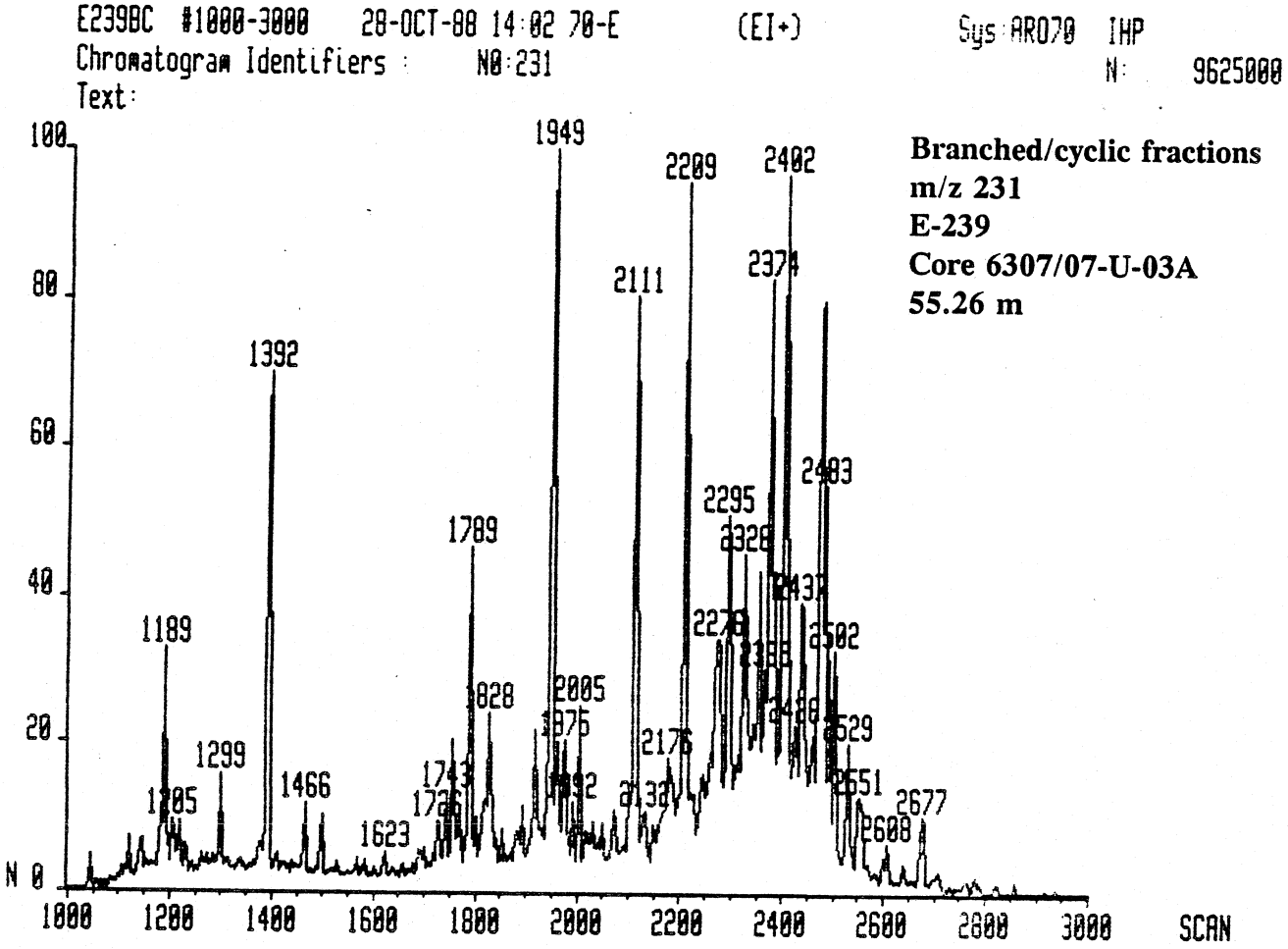
Branched/cyclic fractions
m/z 231
E-214
Core 6307/07-U-03A
37.34 m



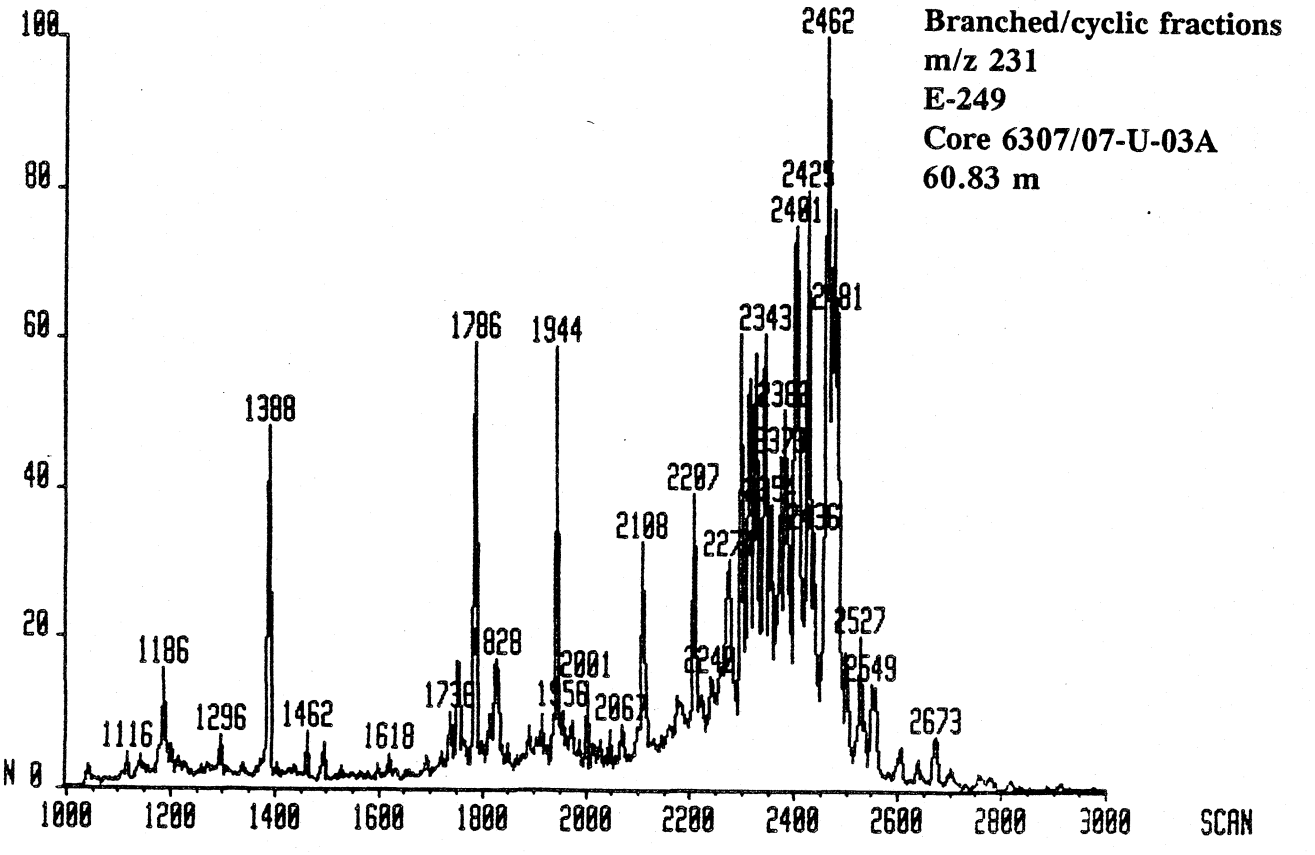
Branched/cyclic fractions
m/z 231
E-227
Core 6307/07-U-03A
46.20 m


E2308C #1000-3000 14-OCT-88 12:47 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : N0:231
N: 9048000
Text:
100
80
60
40
20
N 0
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
SCAN
1342
2428
2360
1895
2249
2159
2060
1738
1140
1251
1415
1447
1952
2546
2686
Branched/cyclic fractions
m/z 231
E-230
Core 6307/07-U-03A
48.77 m

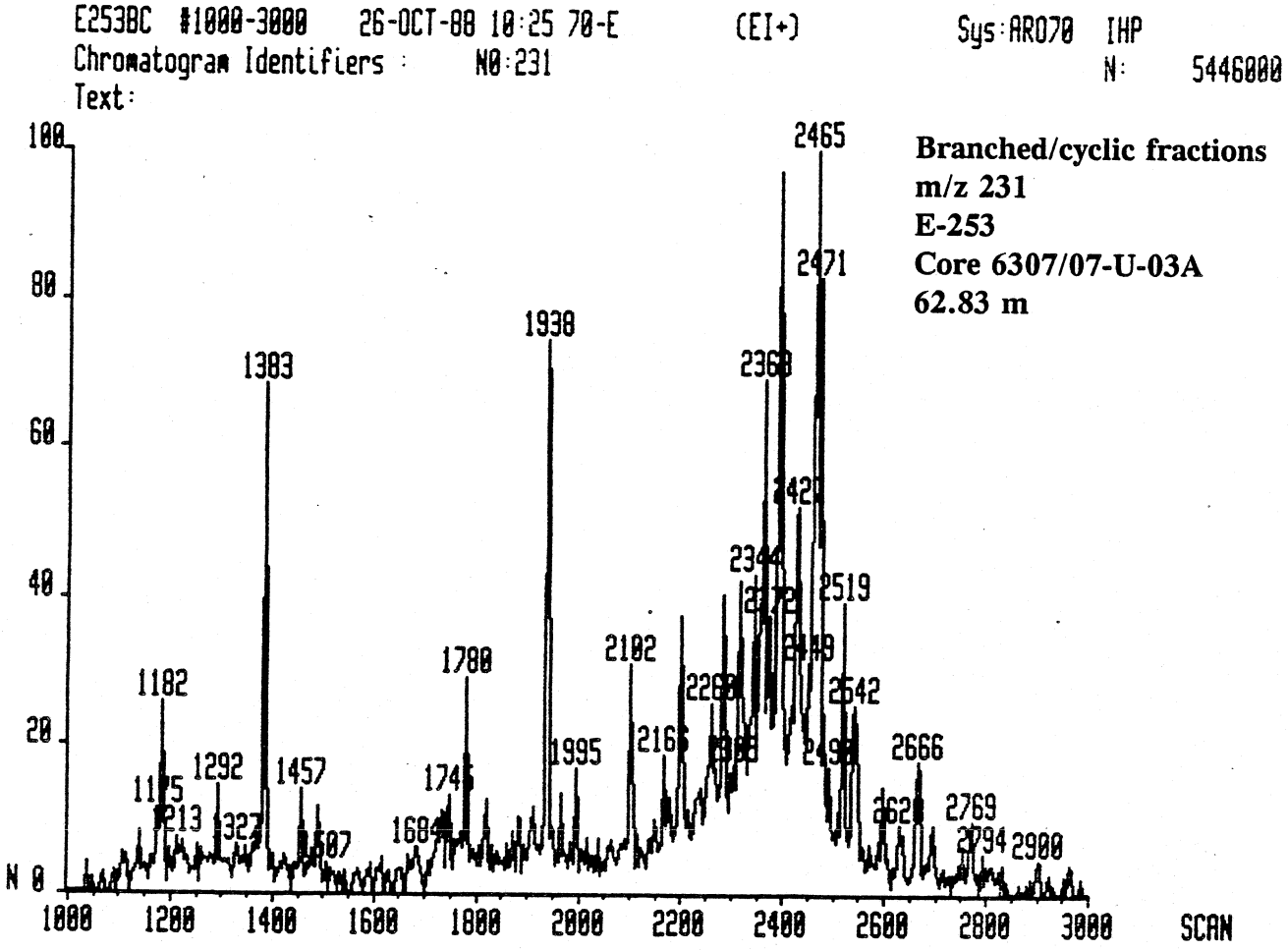

E2358C #1000-3000 25-OCT-88 14:40 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : N0:231
N: 2973000
Text:
100
80
60
40
20
N 0
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
SCAN
2398
1943
2202
2289
1388
2109
1186
1784
1999
2524
2670
2904
Branched/cyclic fractions
m/z 231
E-235
Core 6307/07-U-03A
52.36 m

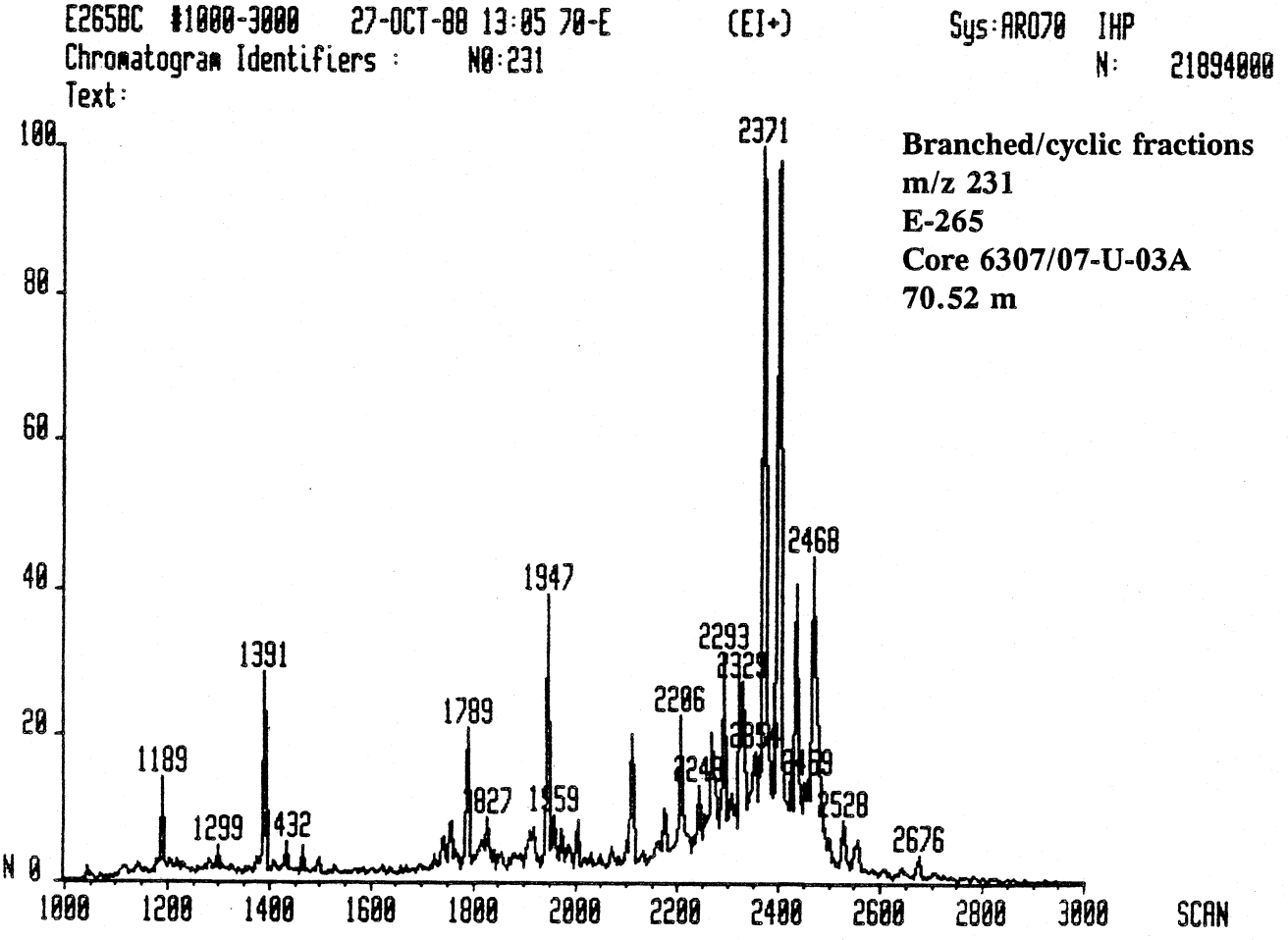


Branched/cyclic fractions
m/z 231
E-239
Core 6307/07-U-03A
55.26 m



Branched/cyclic fractions
m/z 231
E-249
Core 6307/07-U-03A
60.83 m


E253BC #1000-3000 26-OCT-88 10:25 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : N0:231
N: 5446000
Text:
Branched/cyclic fractions
m/z 231
E-253
Core 6307/07-U-03A
62.83 m
SCAN


E265BC #1000-3000 27-OCT-88 13:05 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : N0:231
N: 21894000
Text:
Branched/cyclic fractions
m/z 231
E-265
Core 6307/07-U-03A
70.52 m
SCAN

IKU SINTEF-GRUPPEN

Figure III.5.5e

GC-MS

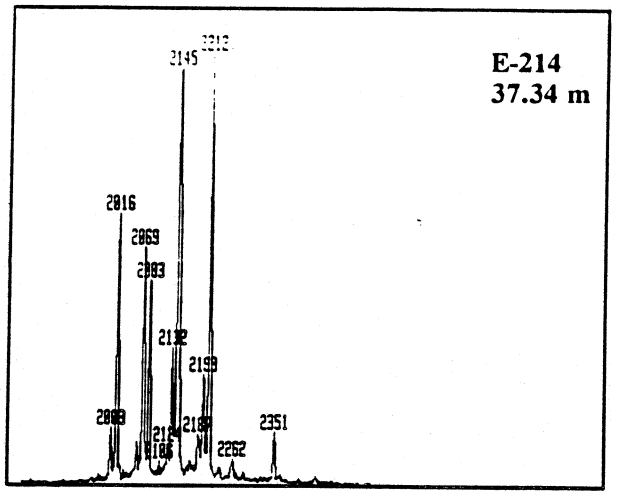
of

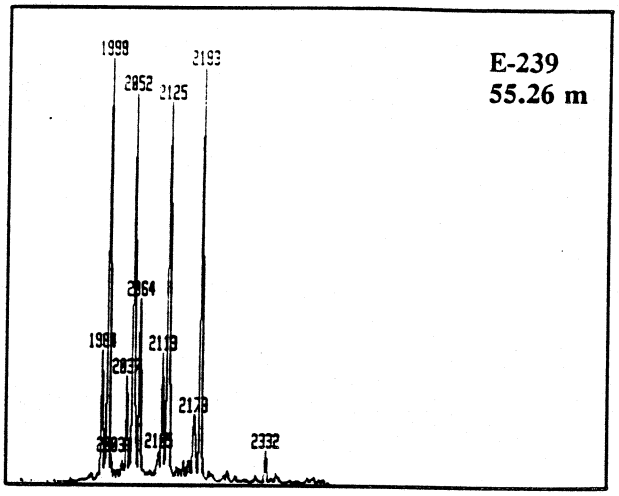
branched/cycloalkanes in extracts

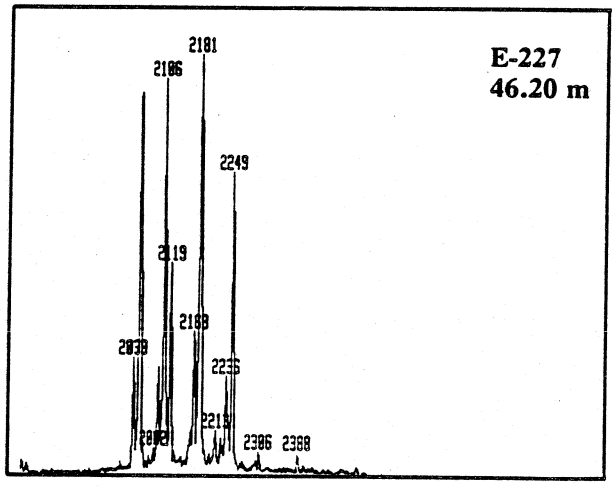
m/z 257

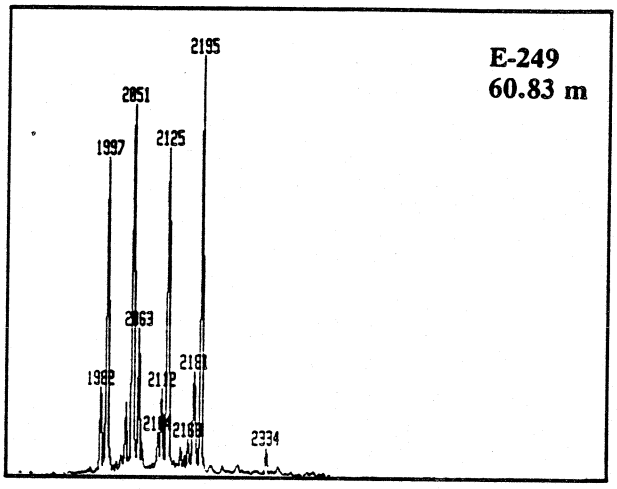
(Further identification of peaks, see section II)

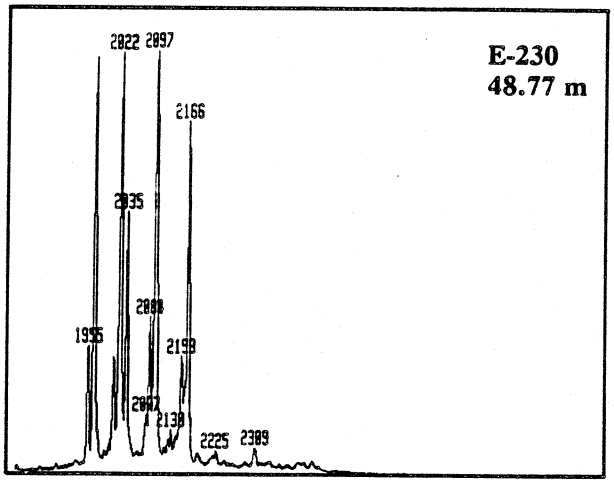
m/z 257 Rearranged sterenes. Core 6307/07-U-03A

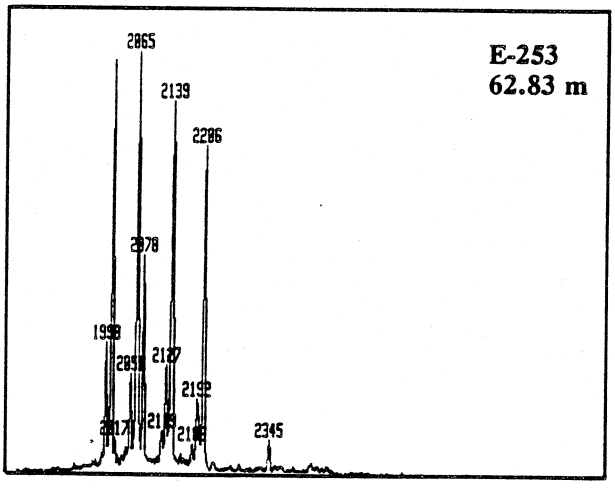


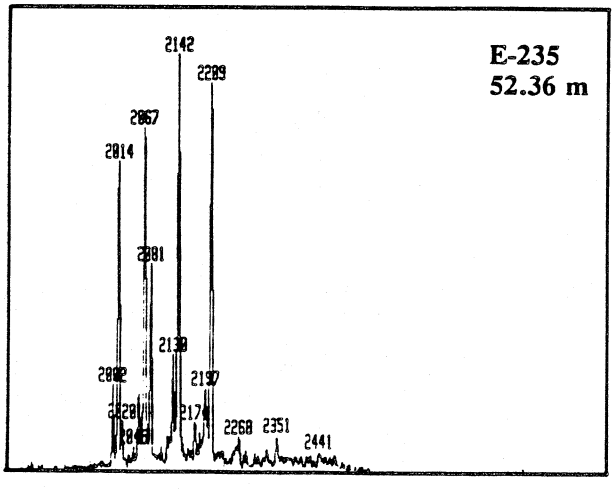


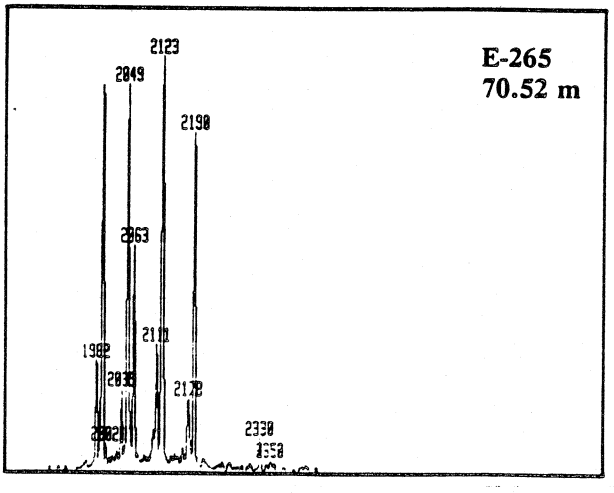


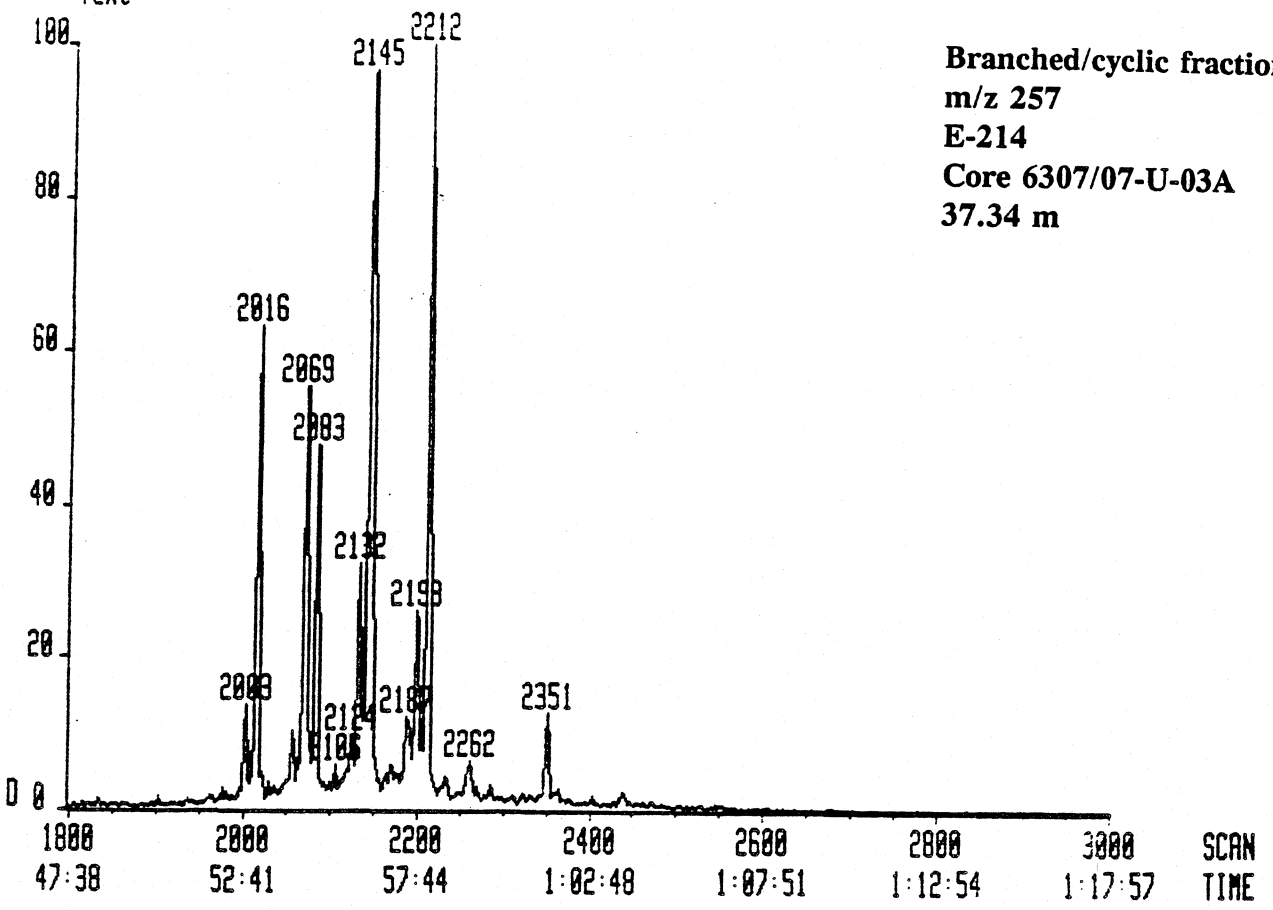




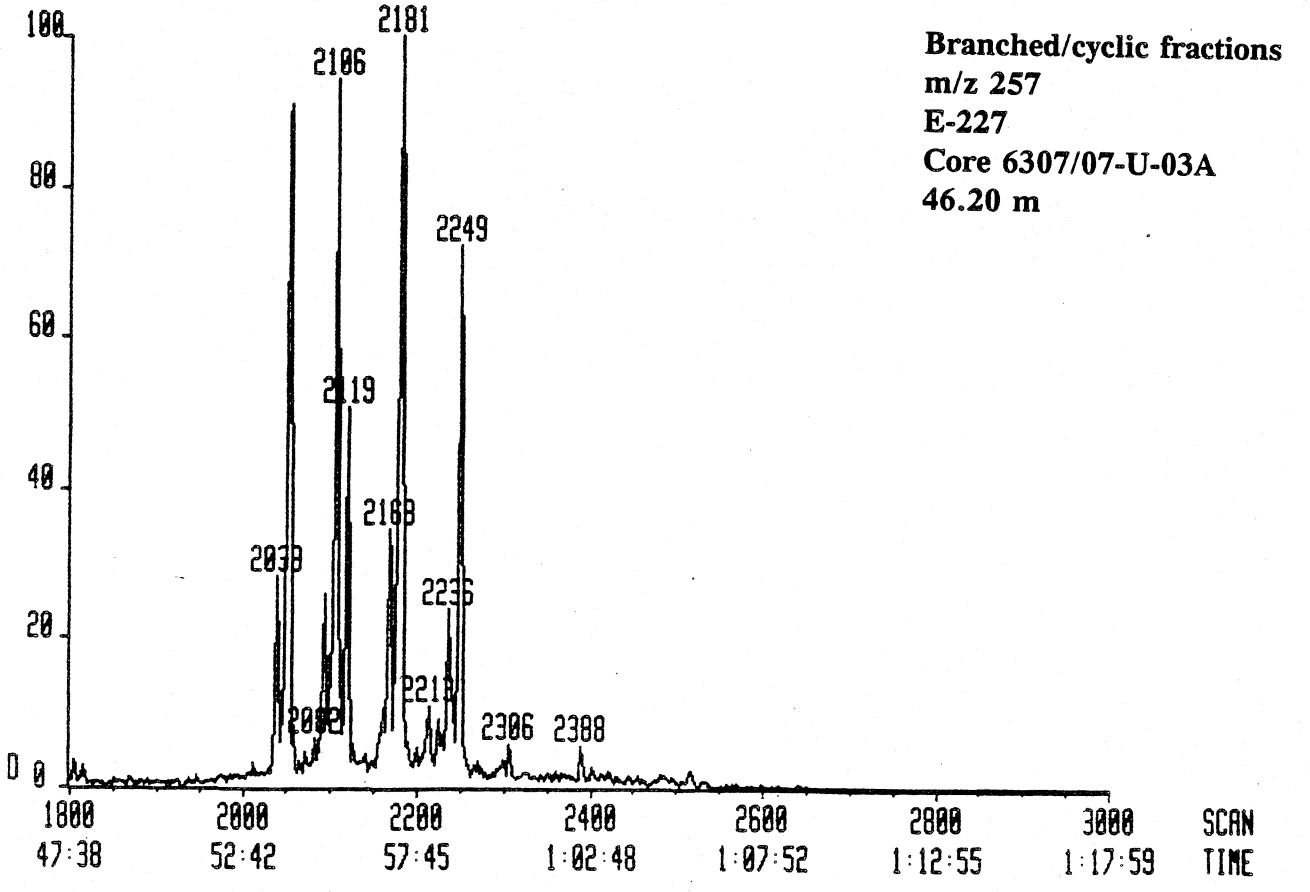




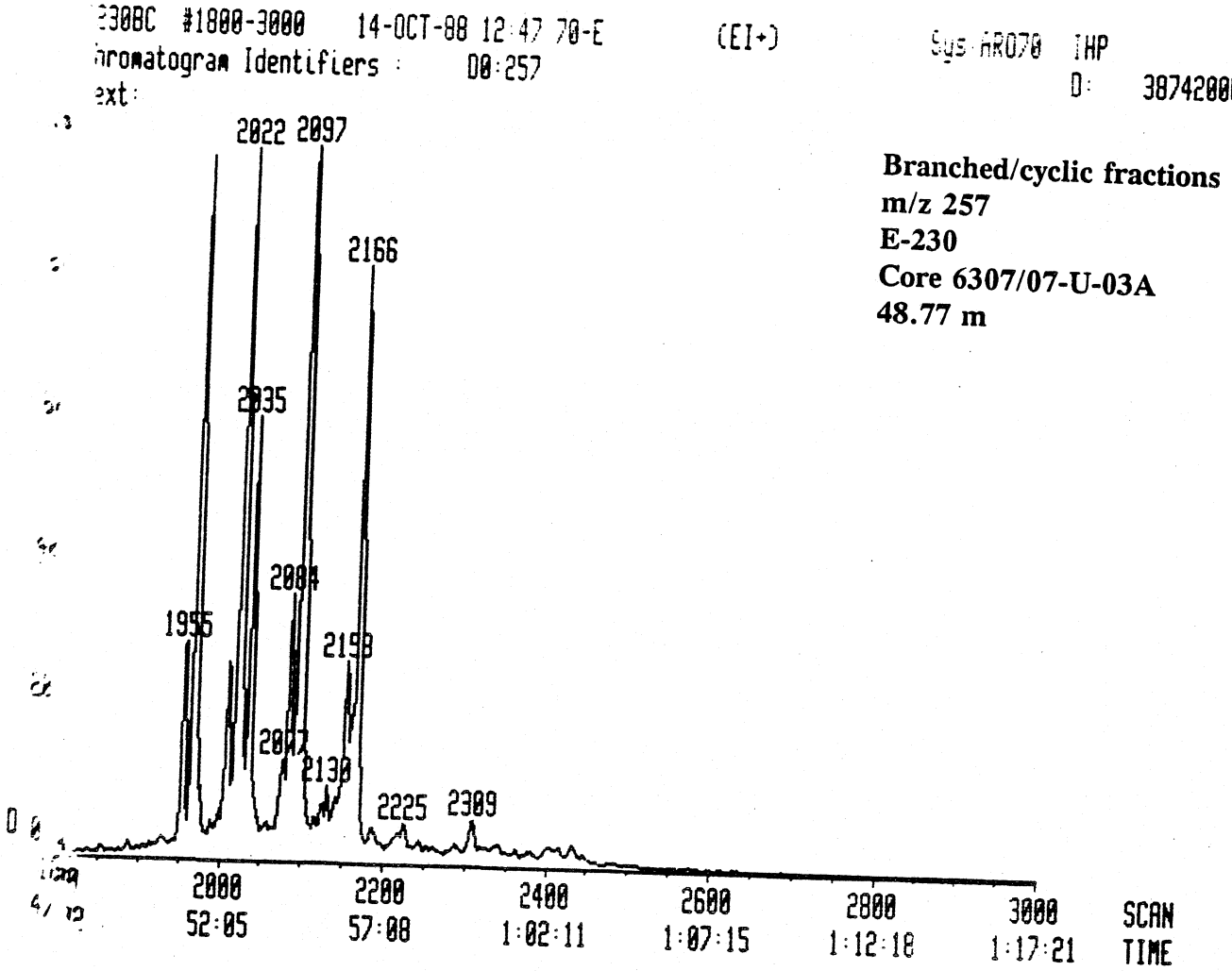




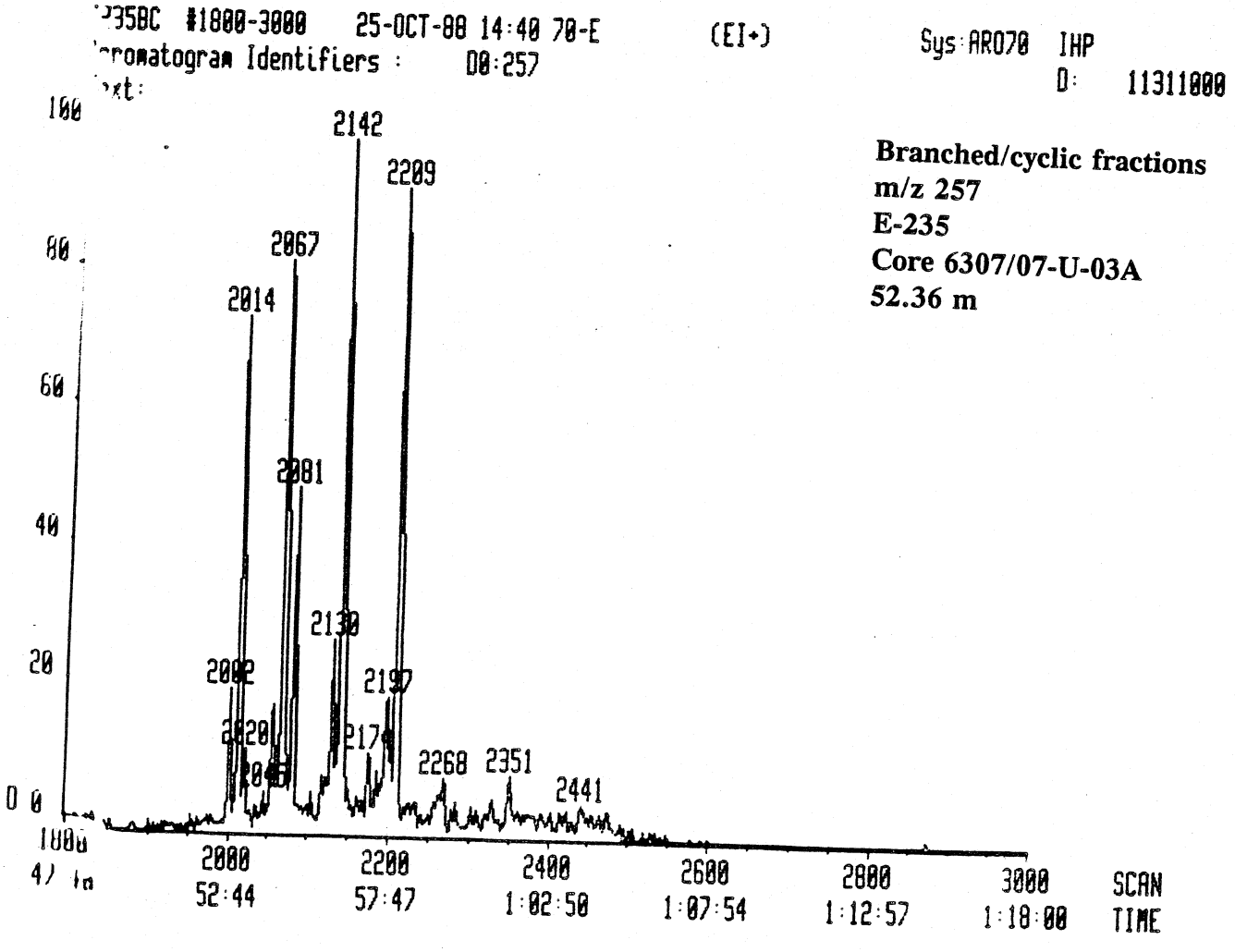
Branched/cyclic fractions
m/z 257
E-214
Core 6307/07-U-03A
37.34 m



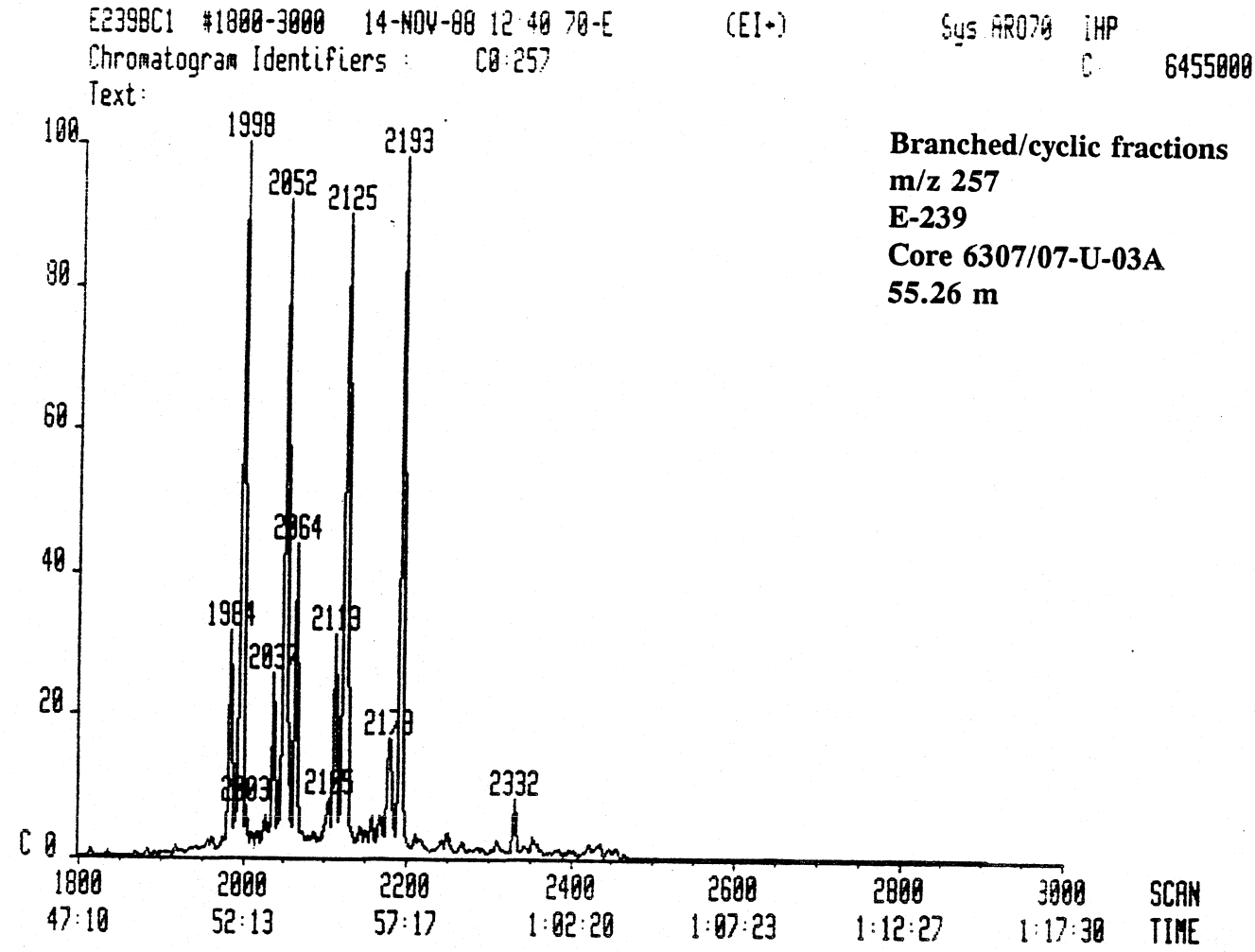
Branched/cyclic fractions
m/z 257
E-227
Core 6307/07-U-03A
46.20 m



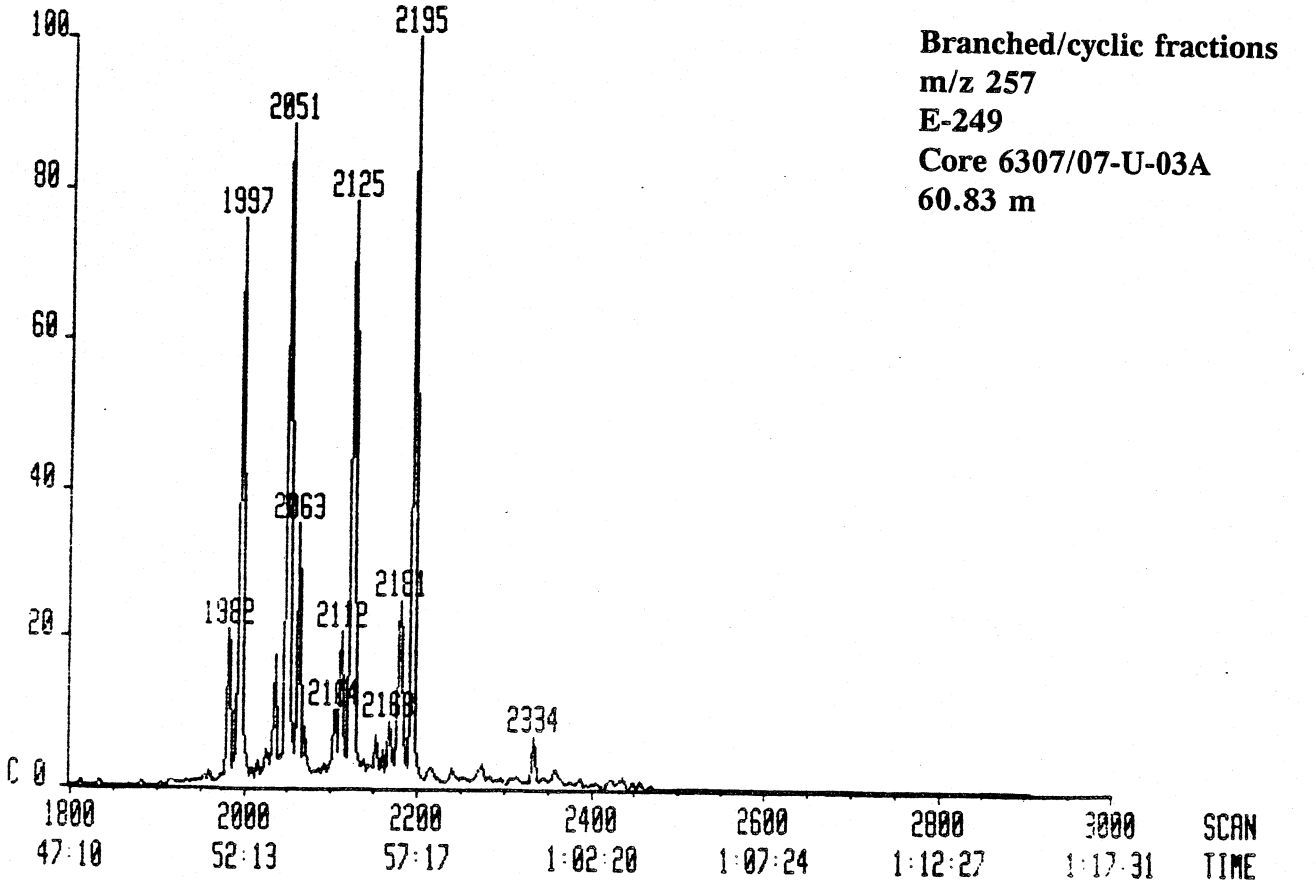
Branched/cyclic fractions
m/z 257
E-230
Core 6307/07-U-03A
48.77 m



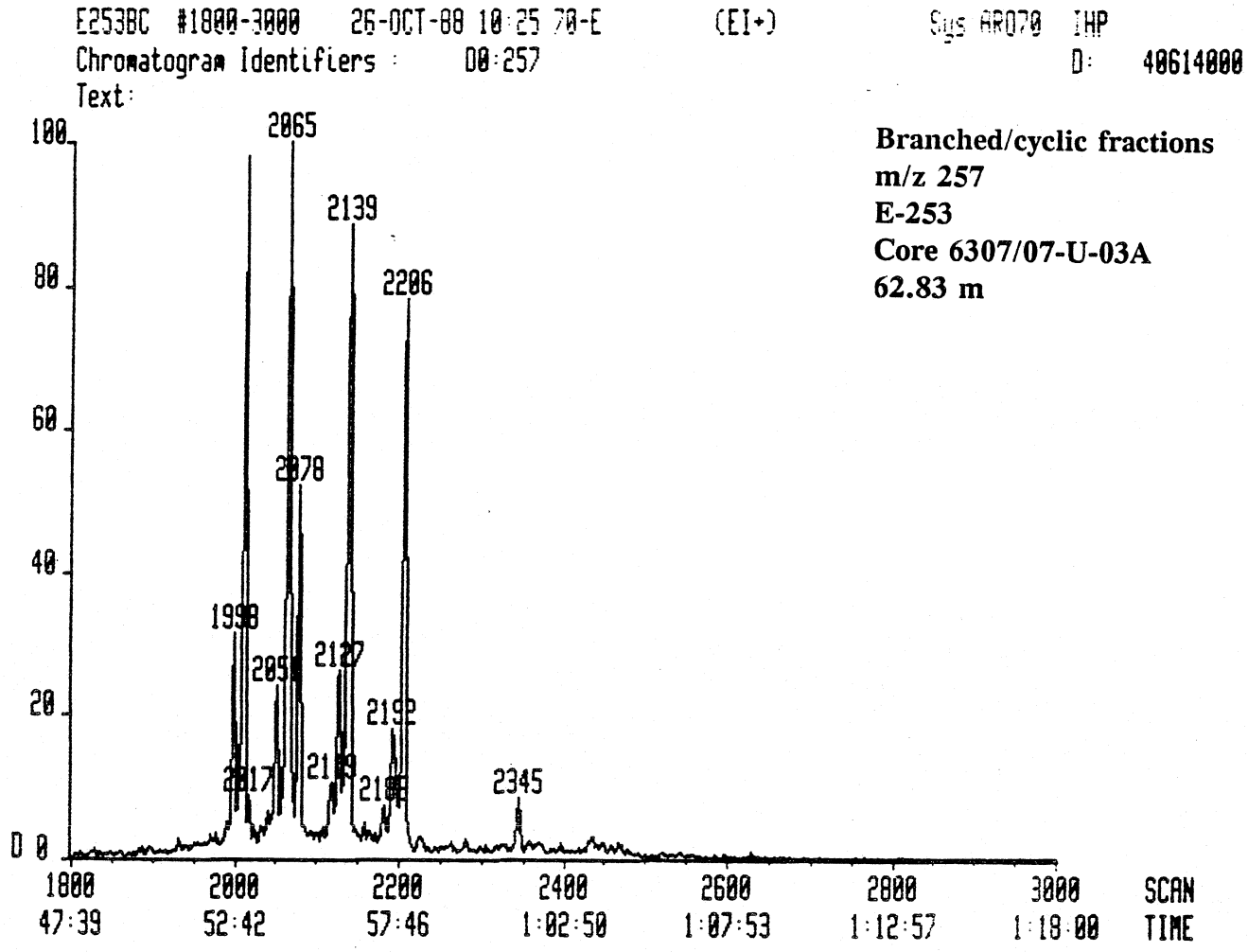
Branched/cyclic fractions
m/z 257
E-235
Core 6307/07-U-03A
52.36 m



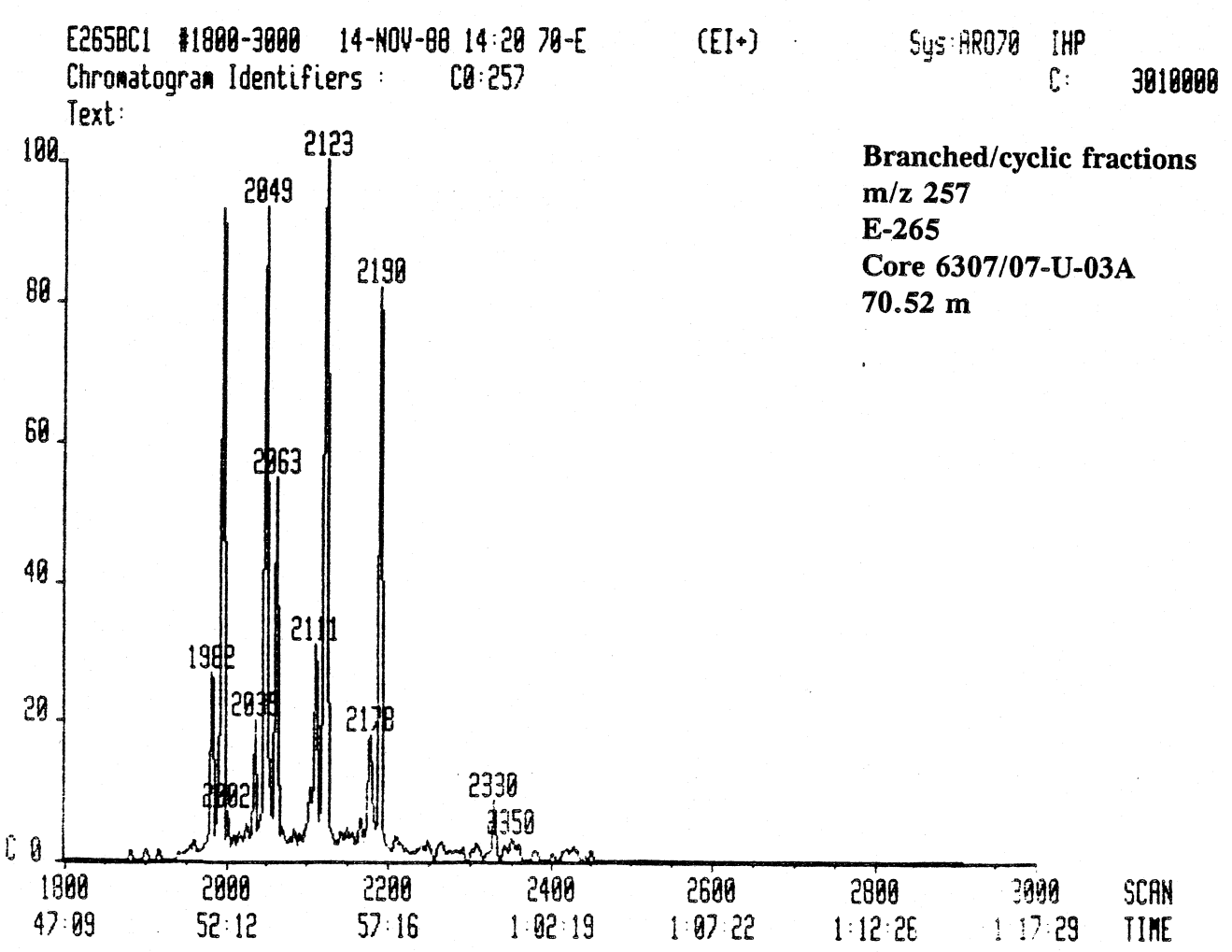
Branched/cyclic fractions
m/z 257
E-239
Core 6307/07-U-03A
55.26 m



Branched/cyclic fractions
m/z 257
E-249
Core 6307/07-U-03A
60.83 m



Branched/cyclic fractions
m/z 257
E-253
Core 6307/07-U-03A
62.83 m



Branched/cyclic fractions
m/z 257
E-265
Core 6307/07-U-03A
70.52 m

IKU SINTEF-GRUPPEN

Figure III.5.5f

GC-MS

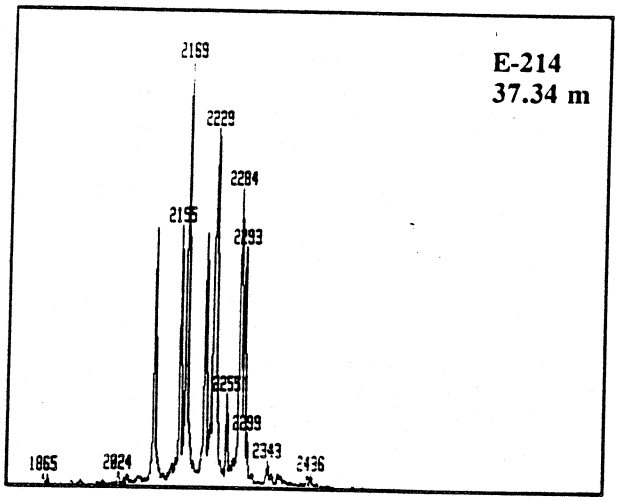
of

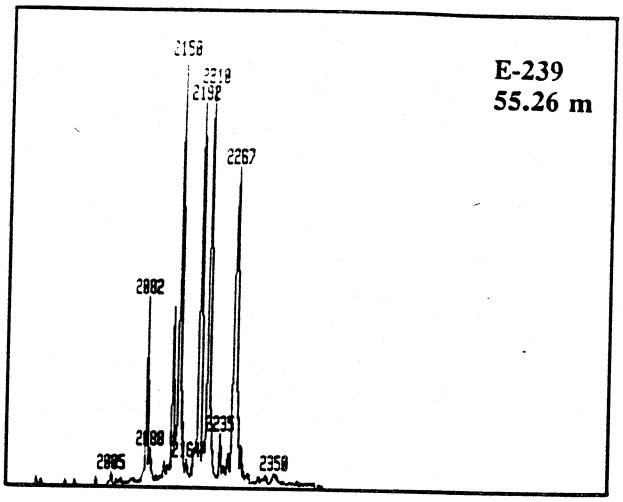
branched/cycloalkanes in extracts

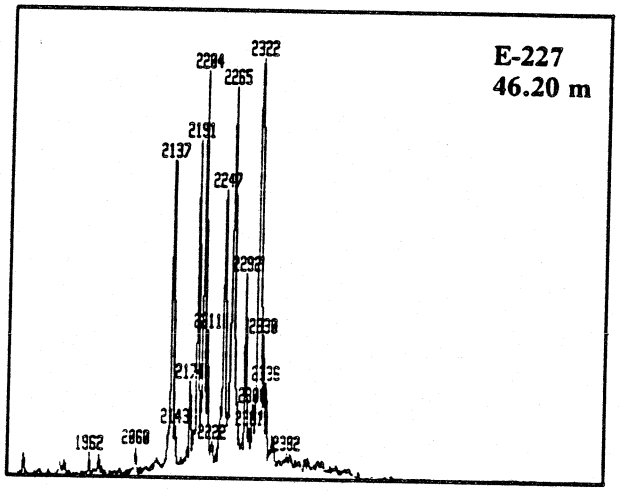
m/z 271

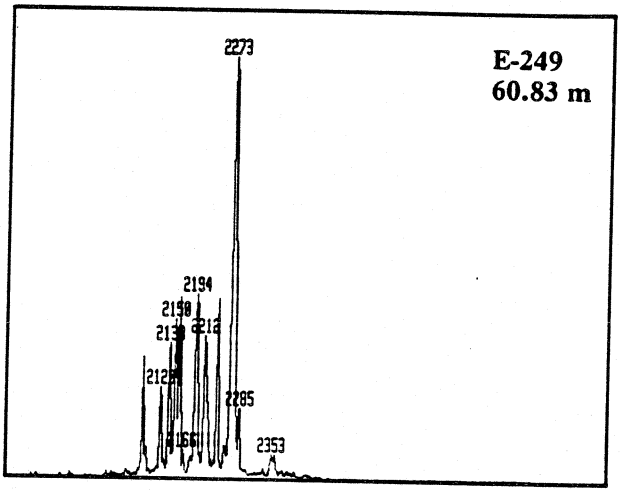
(Further identification of peaks, see section II)

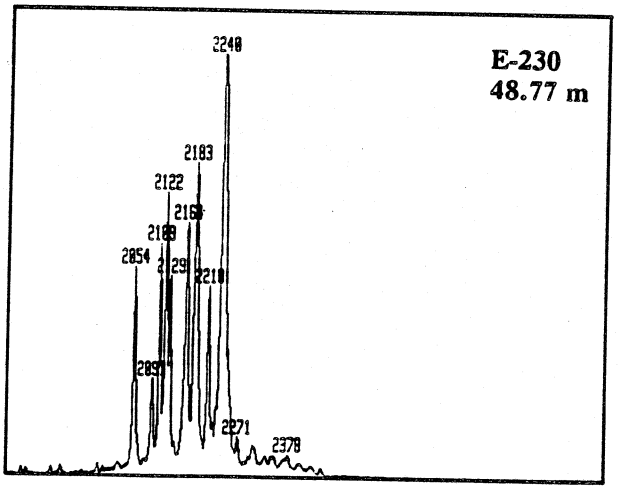
m/z 271 Rearranged sterenes with nuclear methyl group ?. Core 6307/07-U-03A

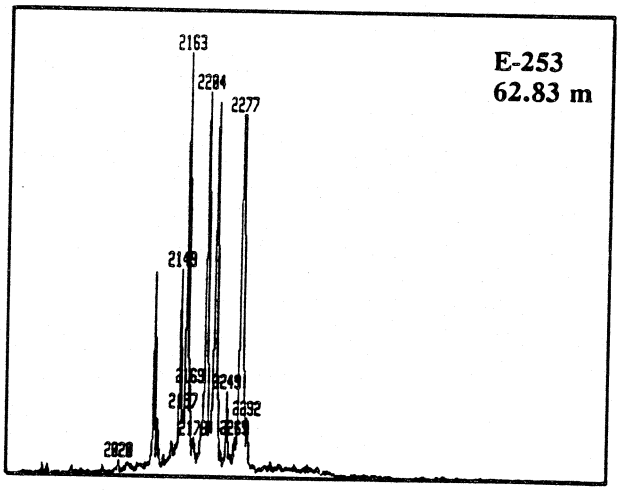


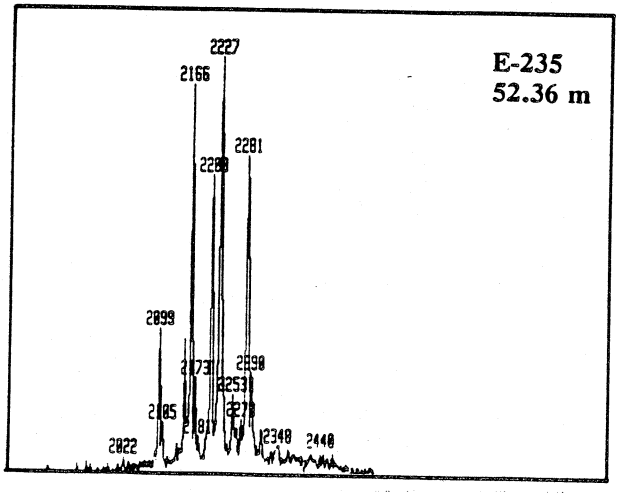


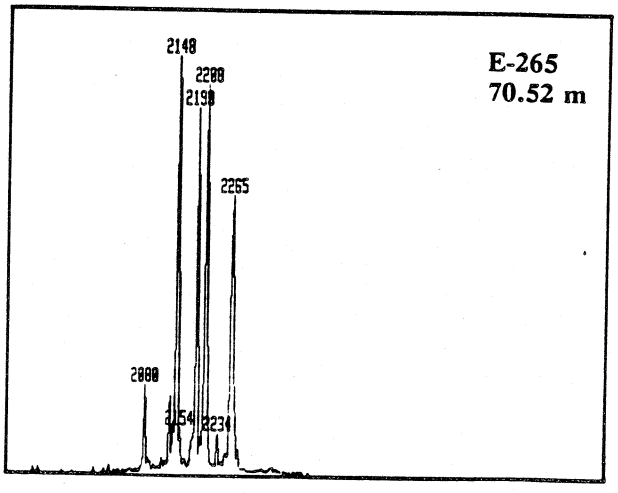


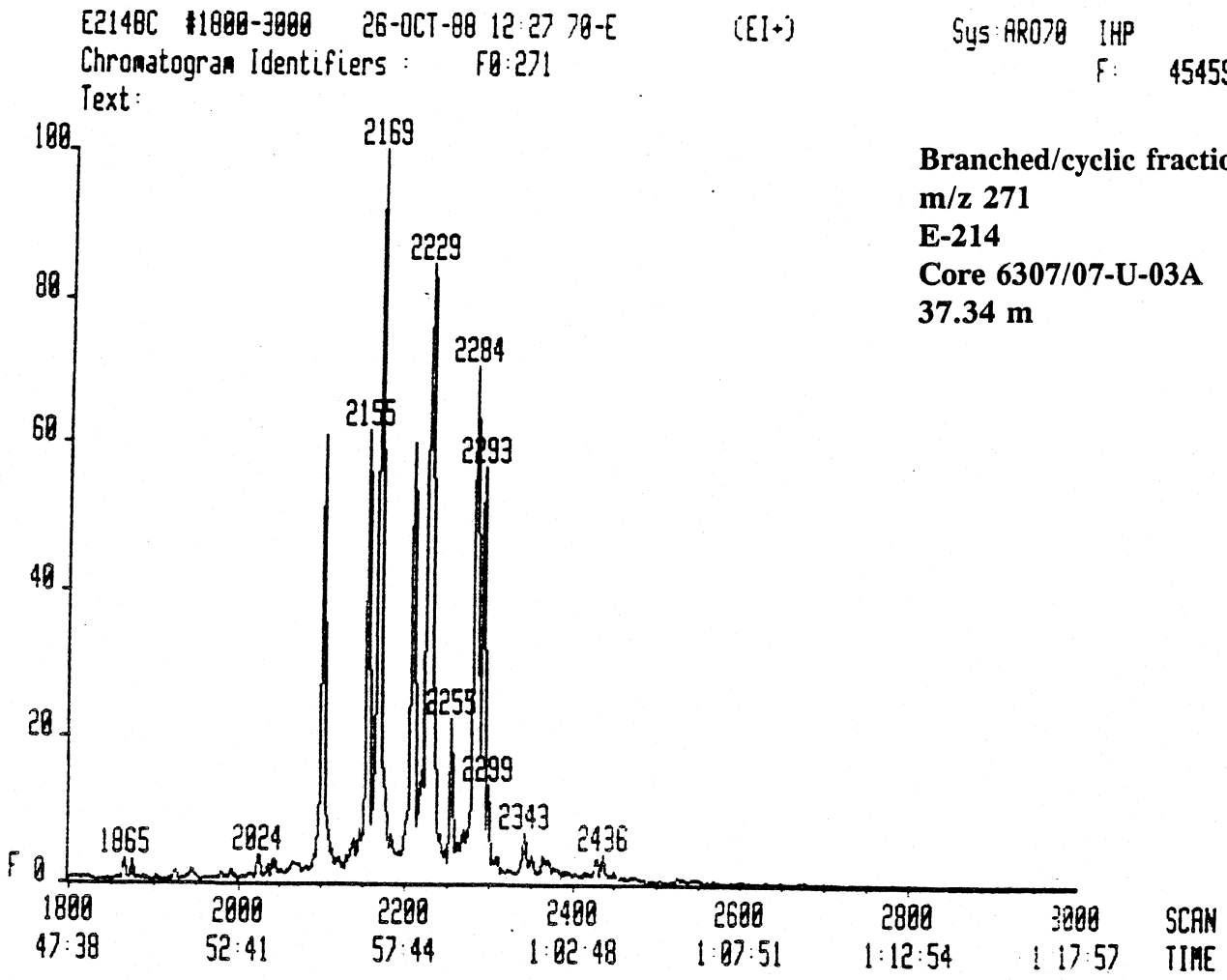




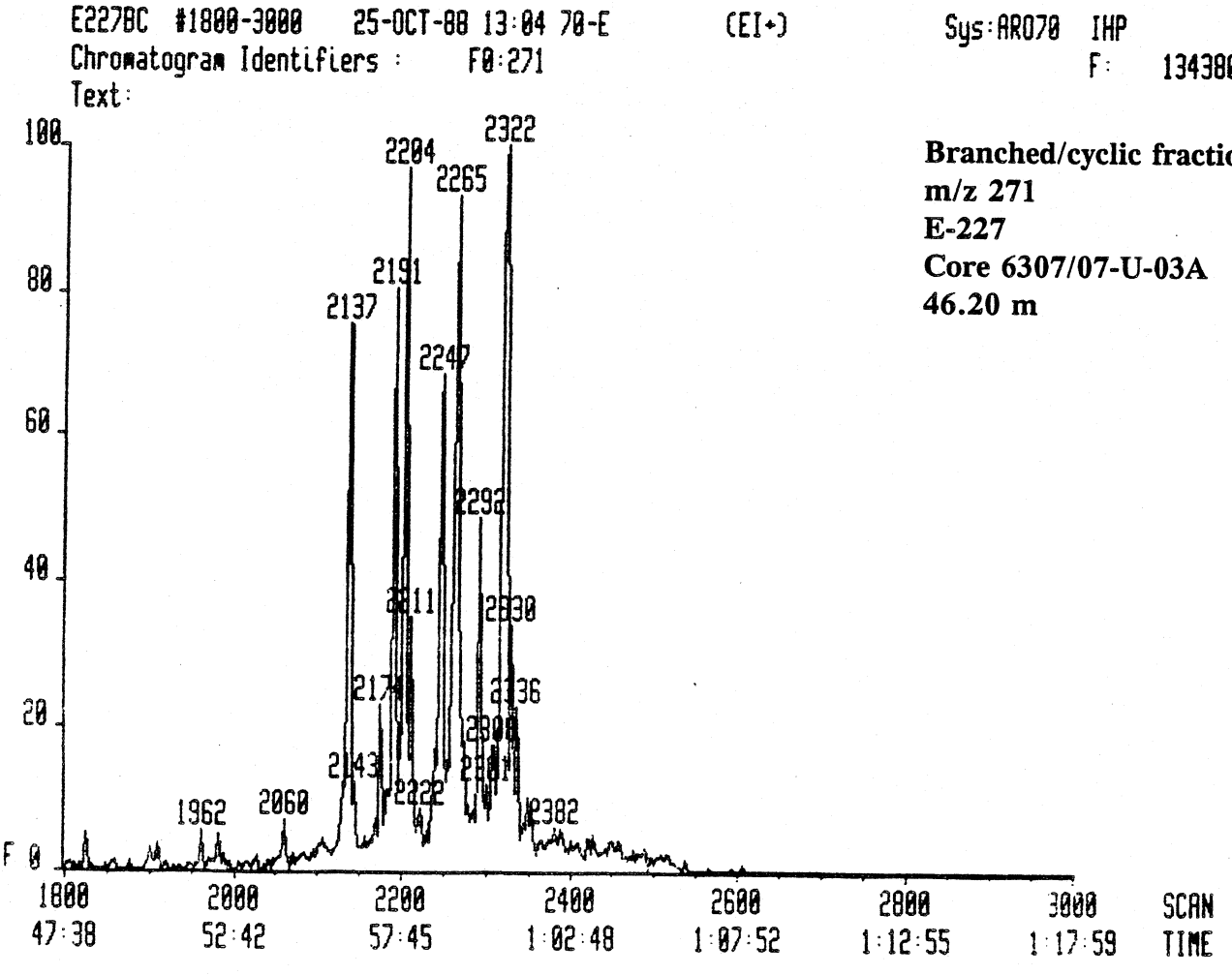




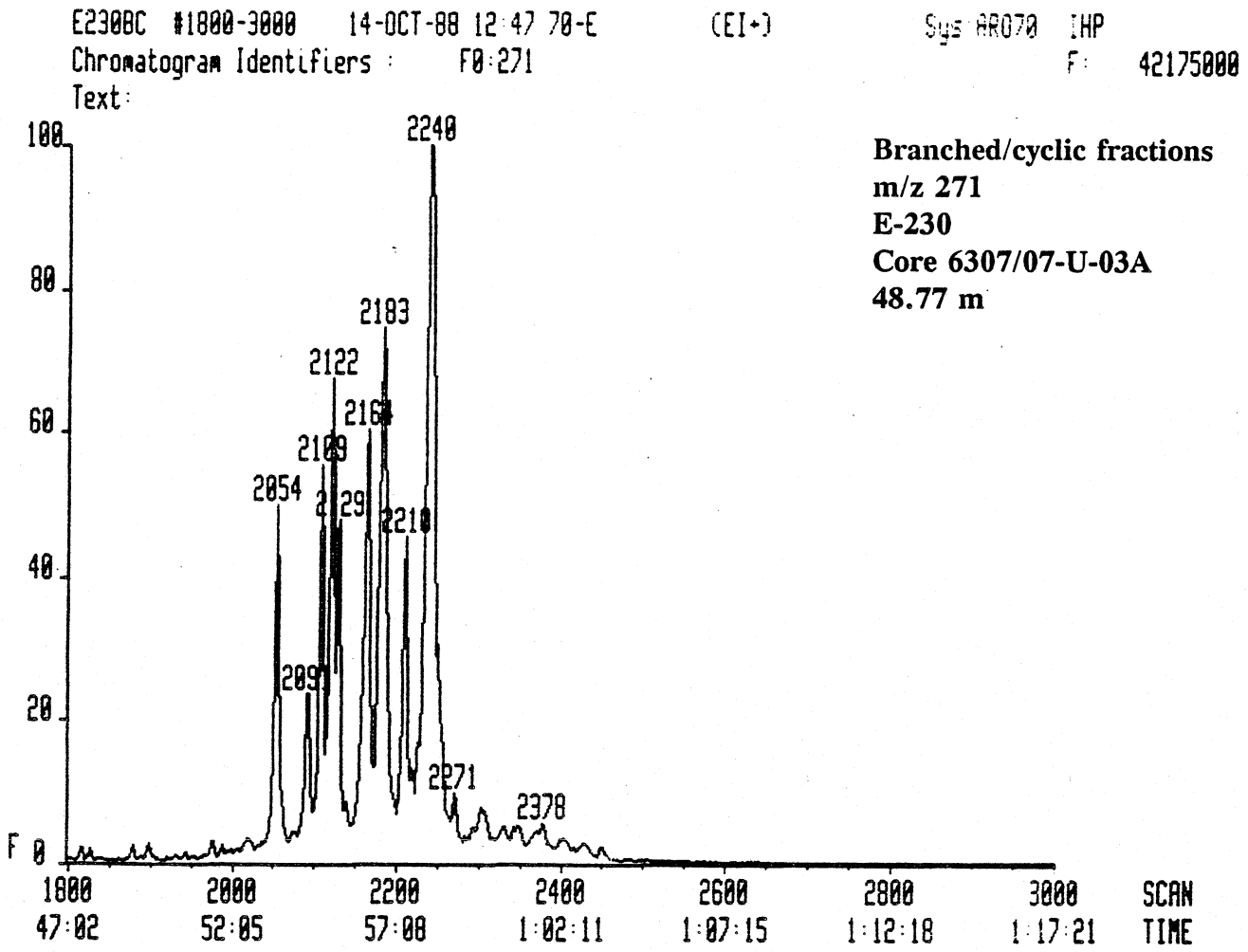




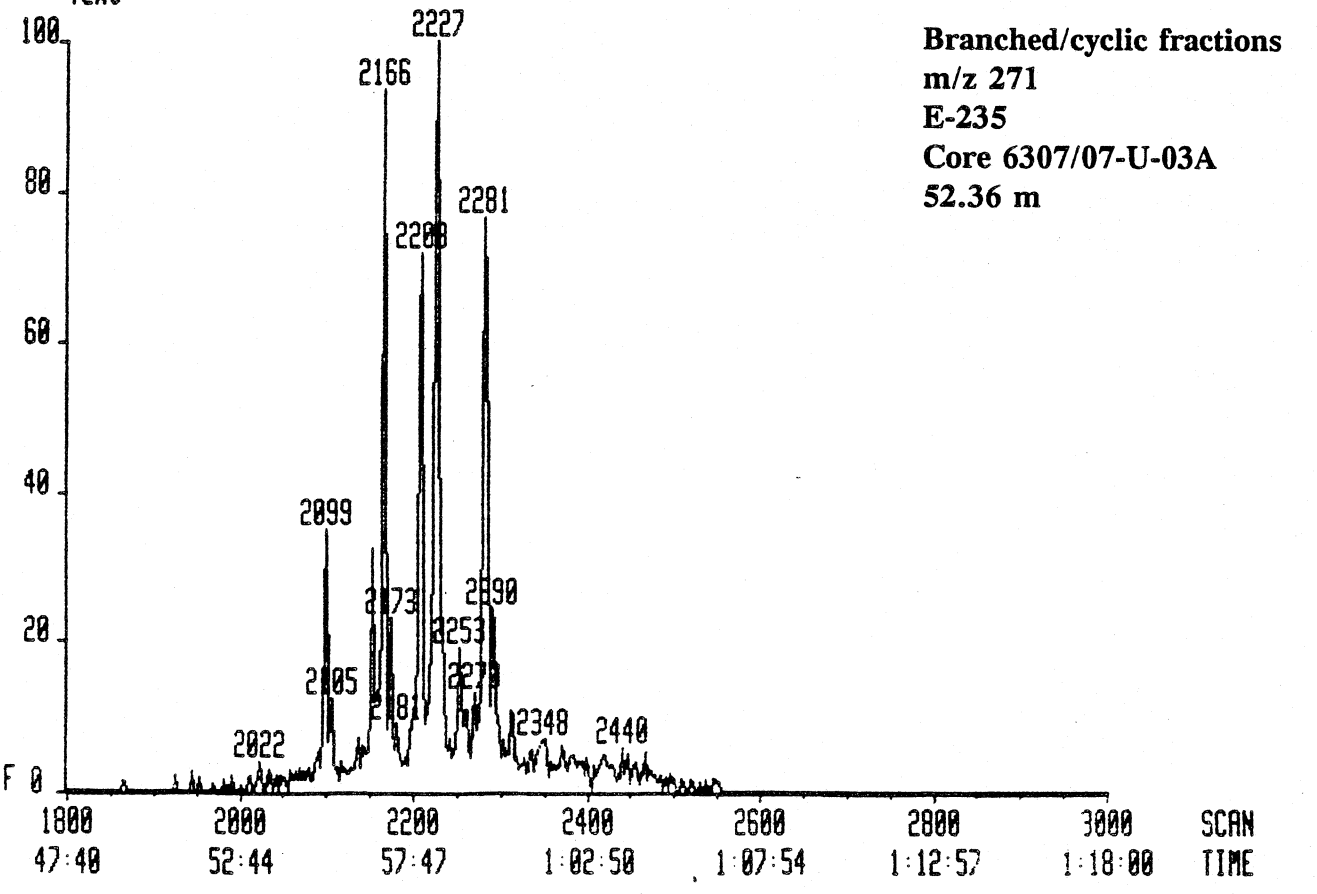
Branched/cyclic fractions
m/z 271
E-214
Core 6307/07-U-03A
37.34 m



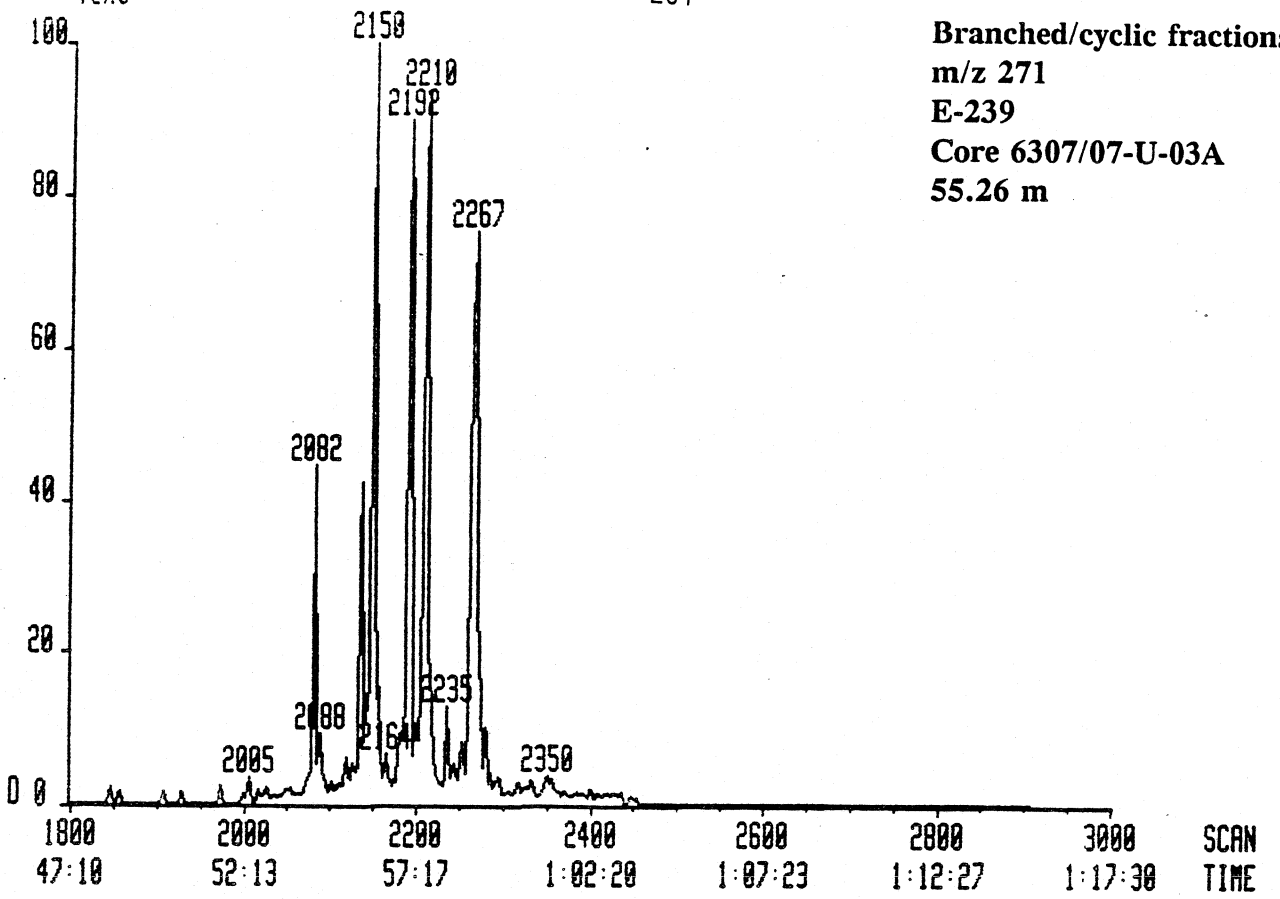
Branched/cyclic fractions
m/z 271
E-227
Core 6307/07-U-03A
46.20 m



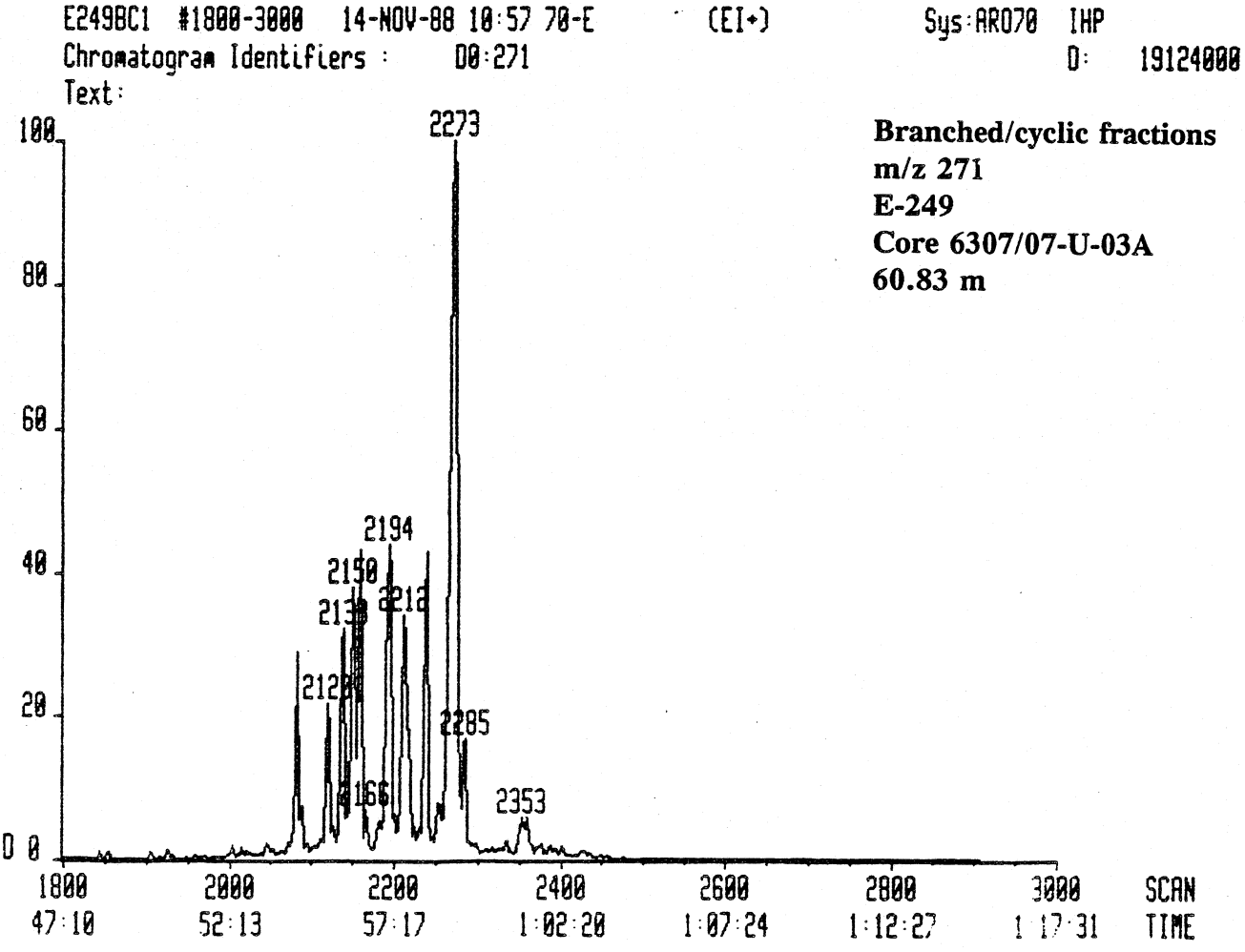
Branched/cyclic fractions
m/z 271
E-230
Core 6307/07-U-03A
48.77 m



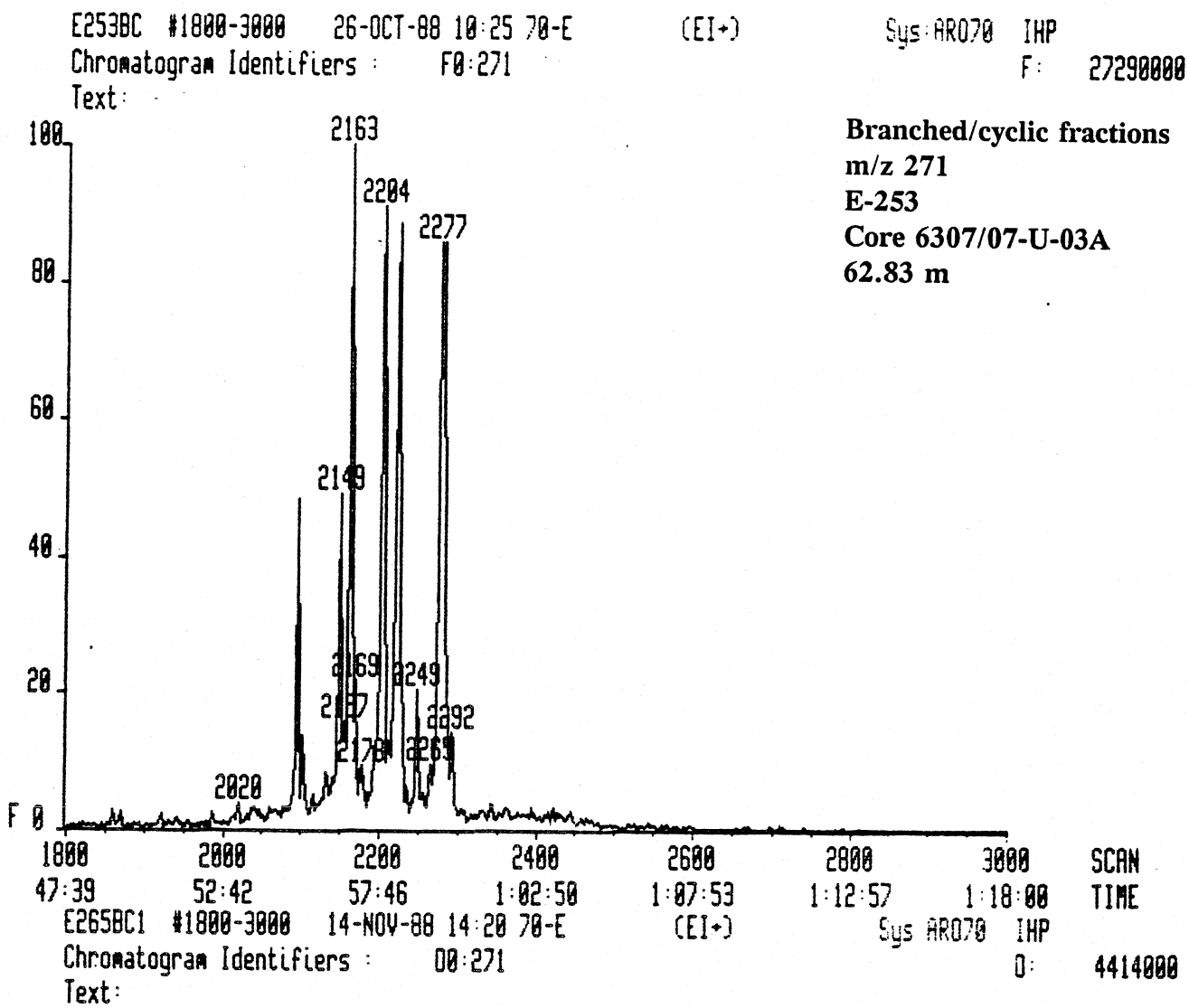
Branched/cyclic fractions
m/z 271
E-235
Core 6307/07-U-03A
52.36 m



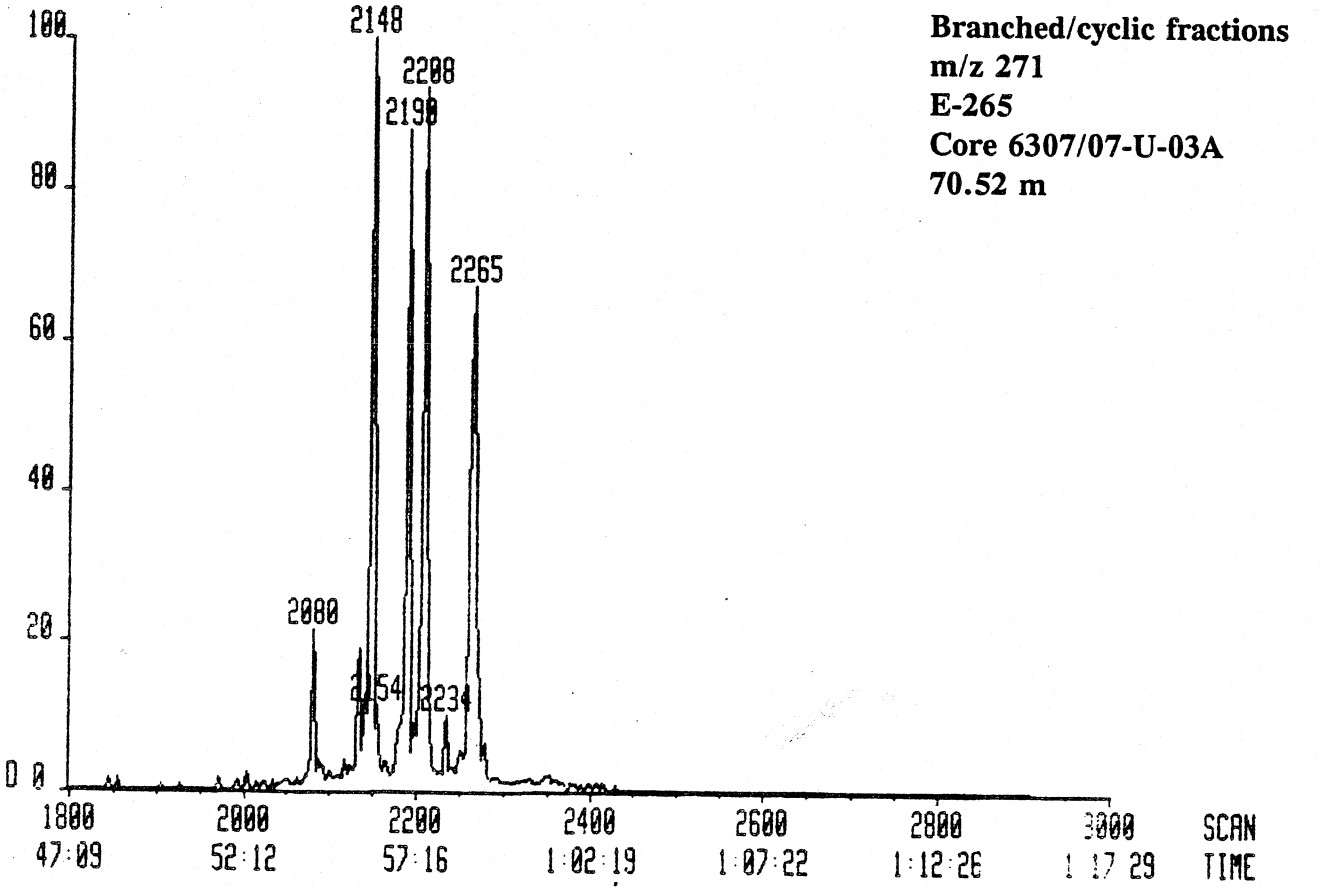
Branched/cyclic fractions
m/z 271
E-239
Core 6307/07-U-03A
55.26 m



Branched/cyclic fractions
m/z 271
E-249
Core 6307/07-U-03A
60.83 m



Branched/cyclic fractions
m/z 271
E-253
Core 6307/07-U-03A
62.83 m



Branched/cyclic fractions
m/z 271
E-265
Core 6307/07-U-03A
70.52 m

IKU SINTEF-GRUPPEN

Figure III.5.6a

PY-GC-MS

of

kerogens

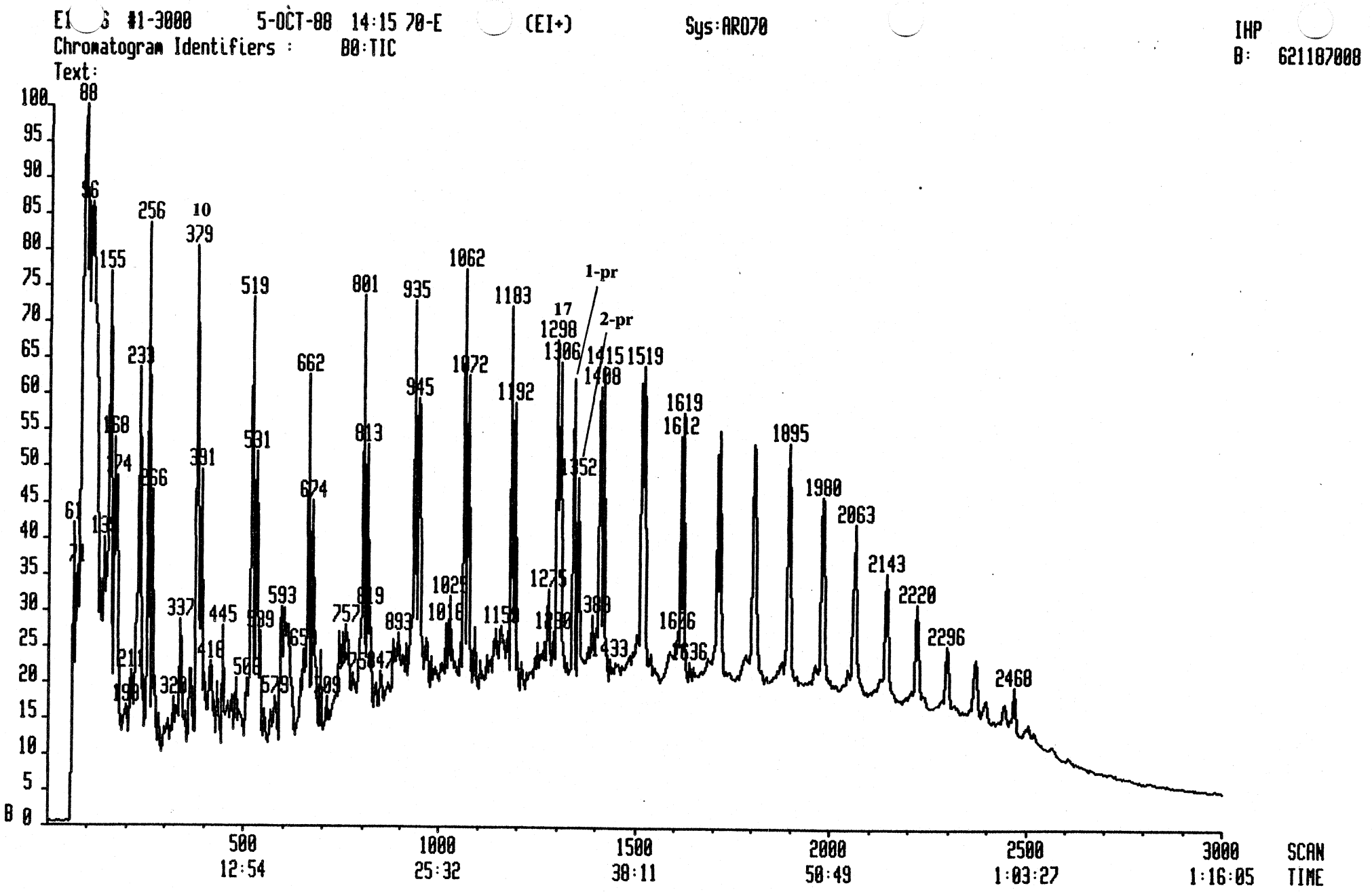
TIC

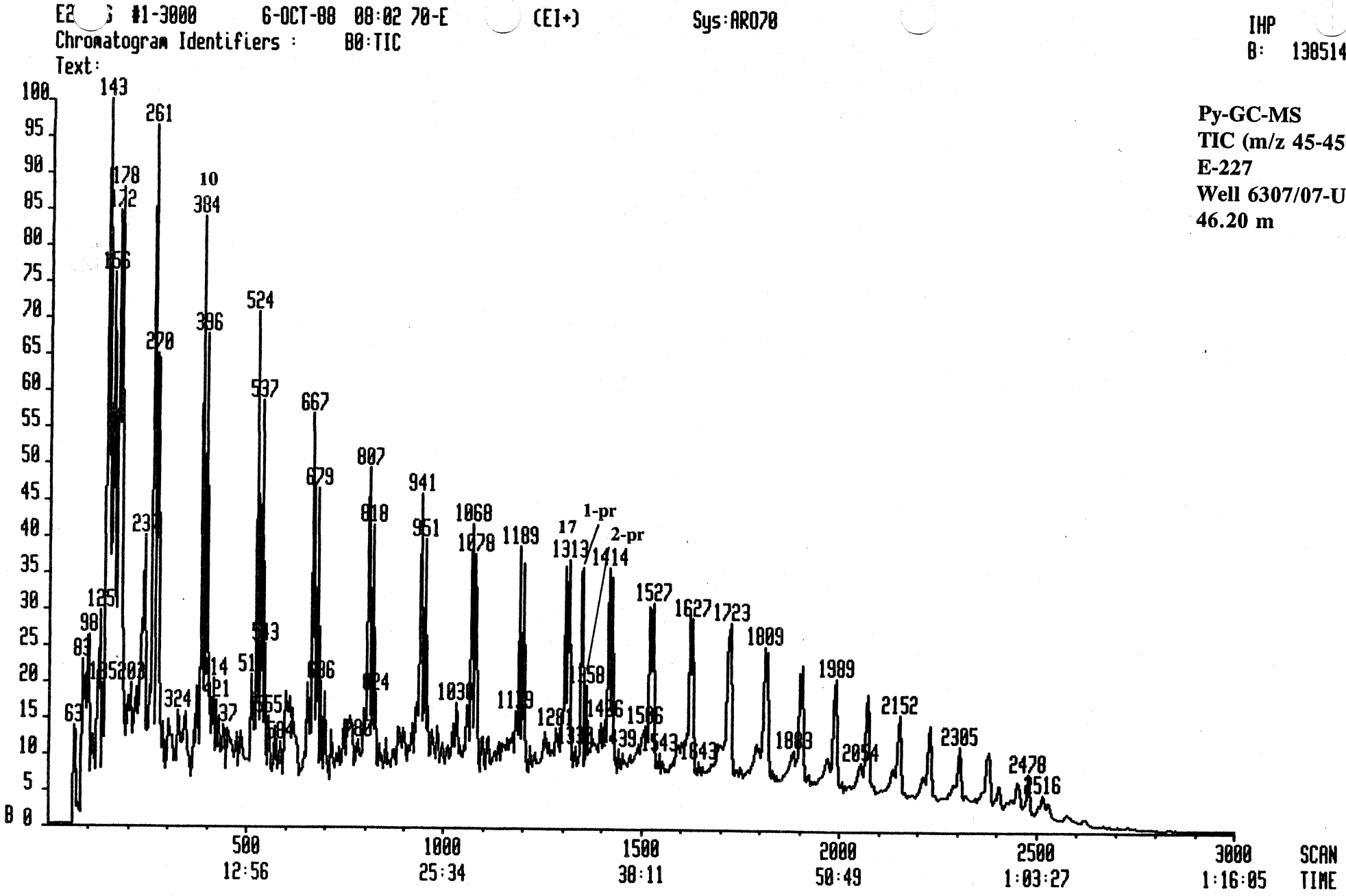
(Further identification of peaks, see section II)

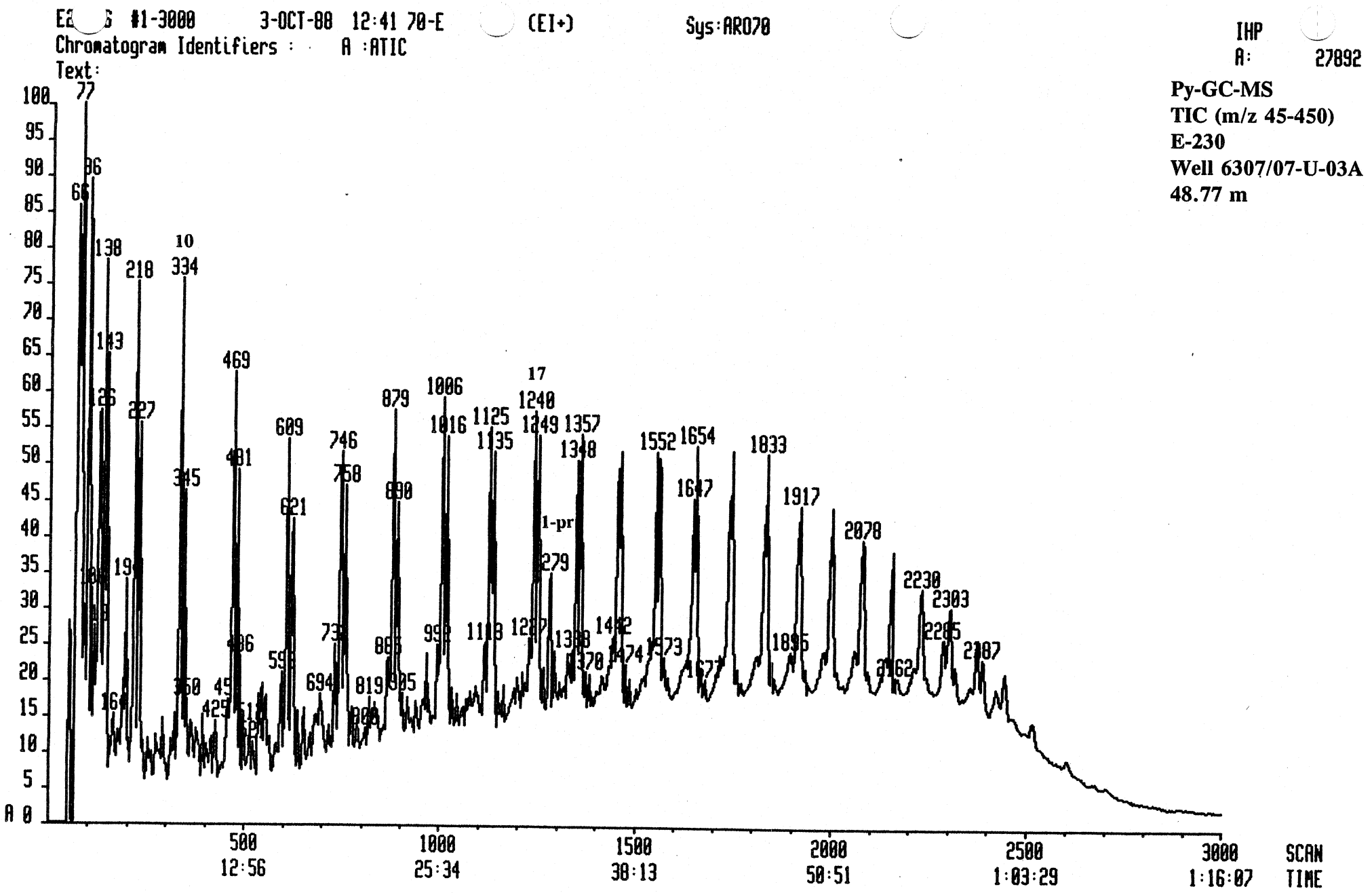
IKU SINTEF-GRUPPEN

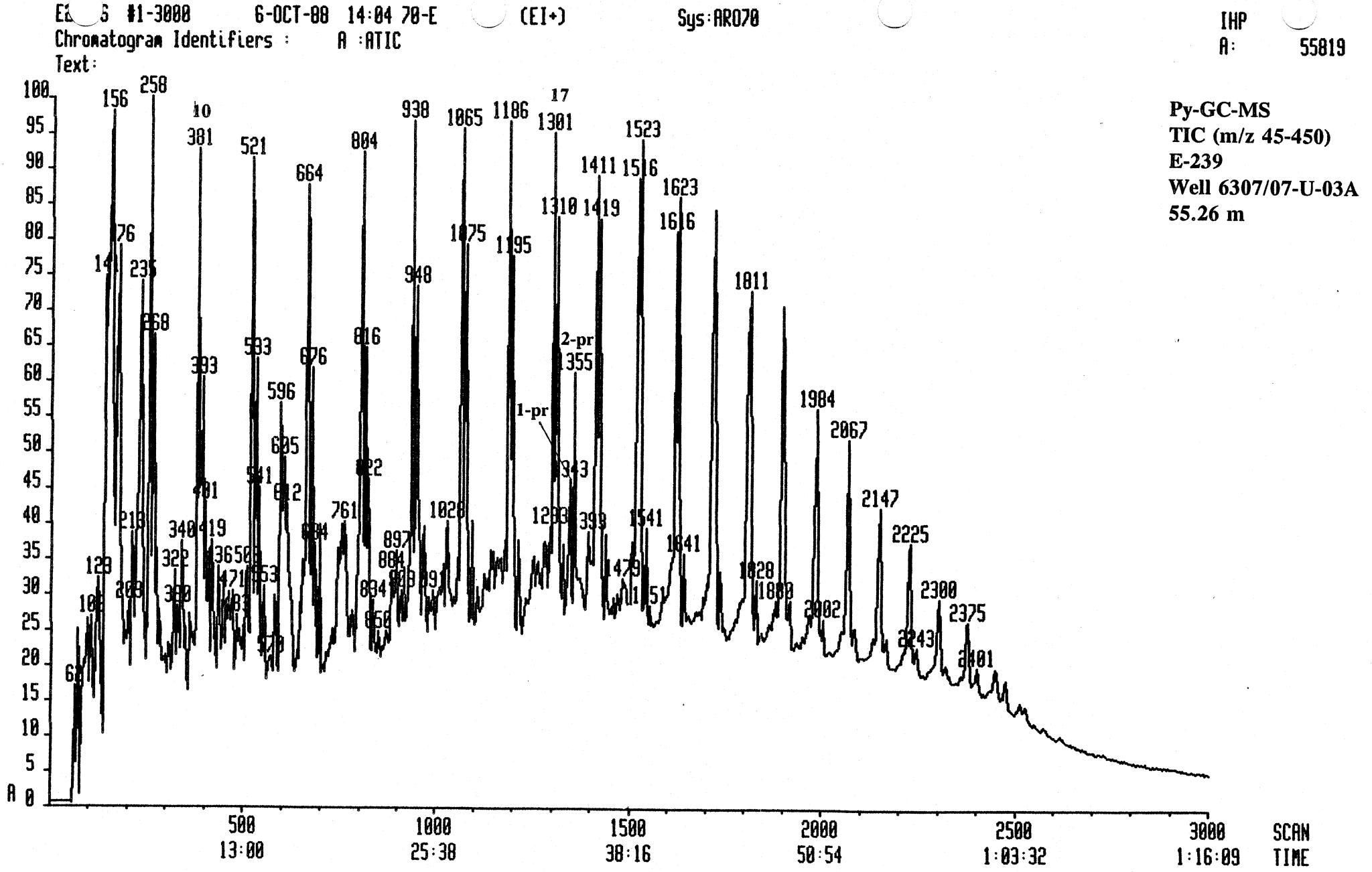
LEGEND TO PYROLYSIS-GC-MS CHROMATOGRAMS

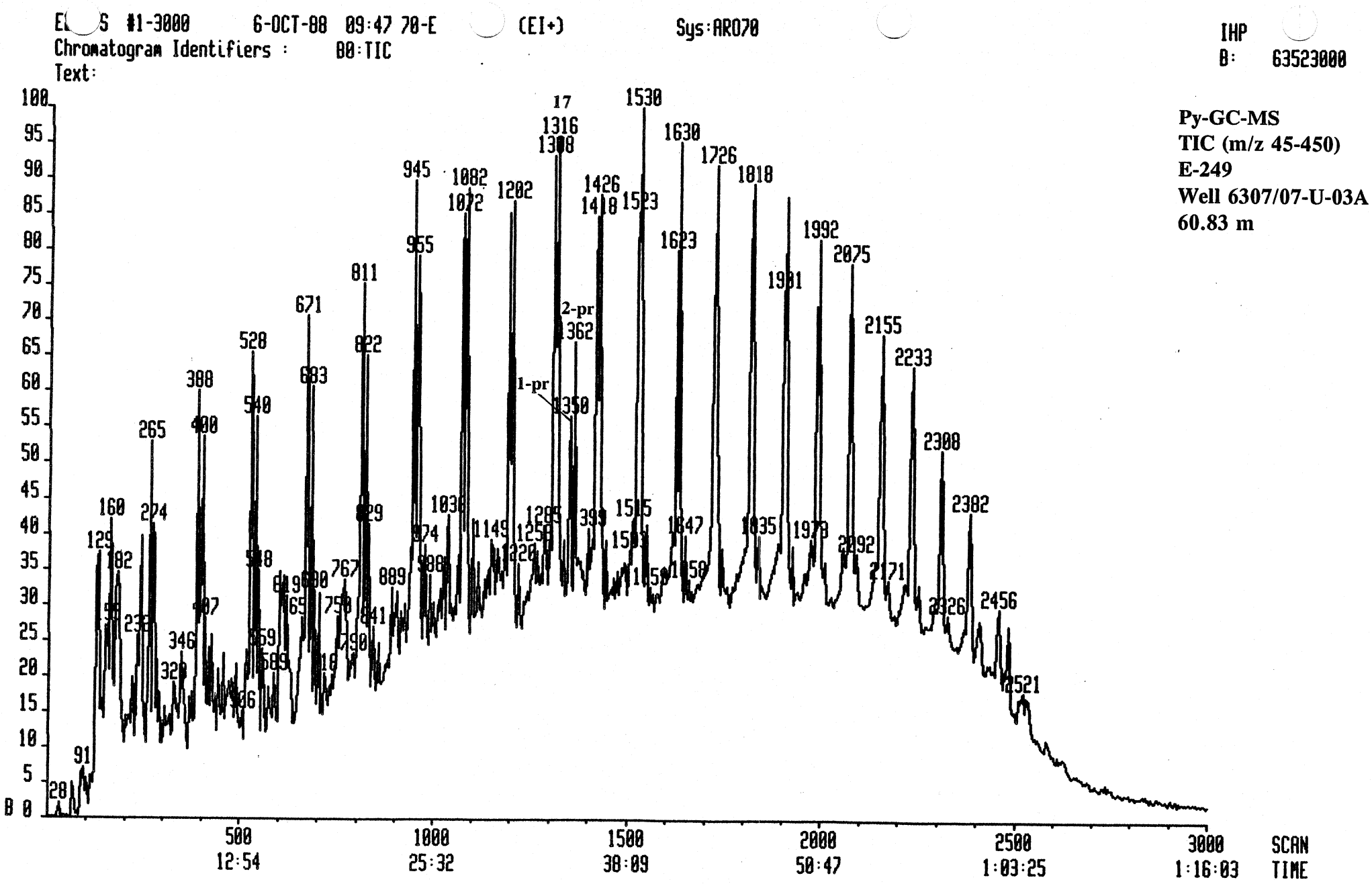
10, 17 etc.	=	Number of C-atoms in n-alkanes, n-alkenes, n-alkadienes.
1-pr	=	1-prisene
2-pr	=	2-pristene
C_nB	=	Alkylbenzenes with n C-atoms in the side chain(s).
MN	=	methylnaphthalenes
DBT	=	dibenzothiophenes
MDBT	=	methyldibenzothiophenes
m+p	=	meta substituted compound and para substituted compounds
o	=	ortho substituted compound

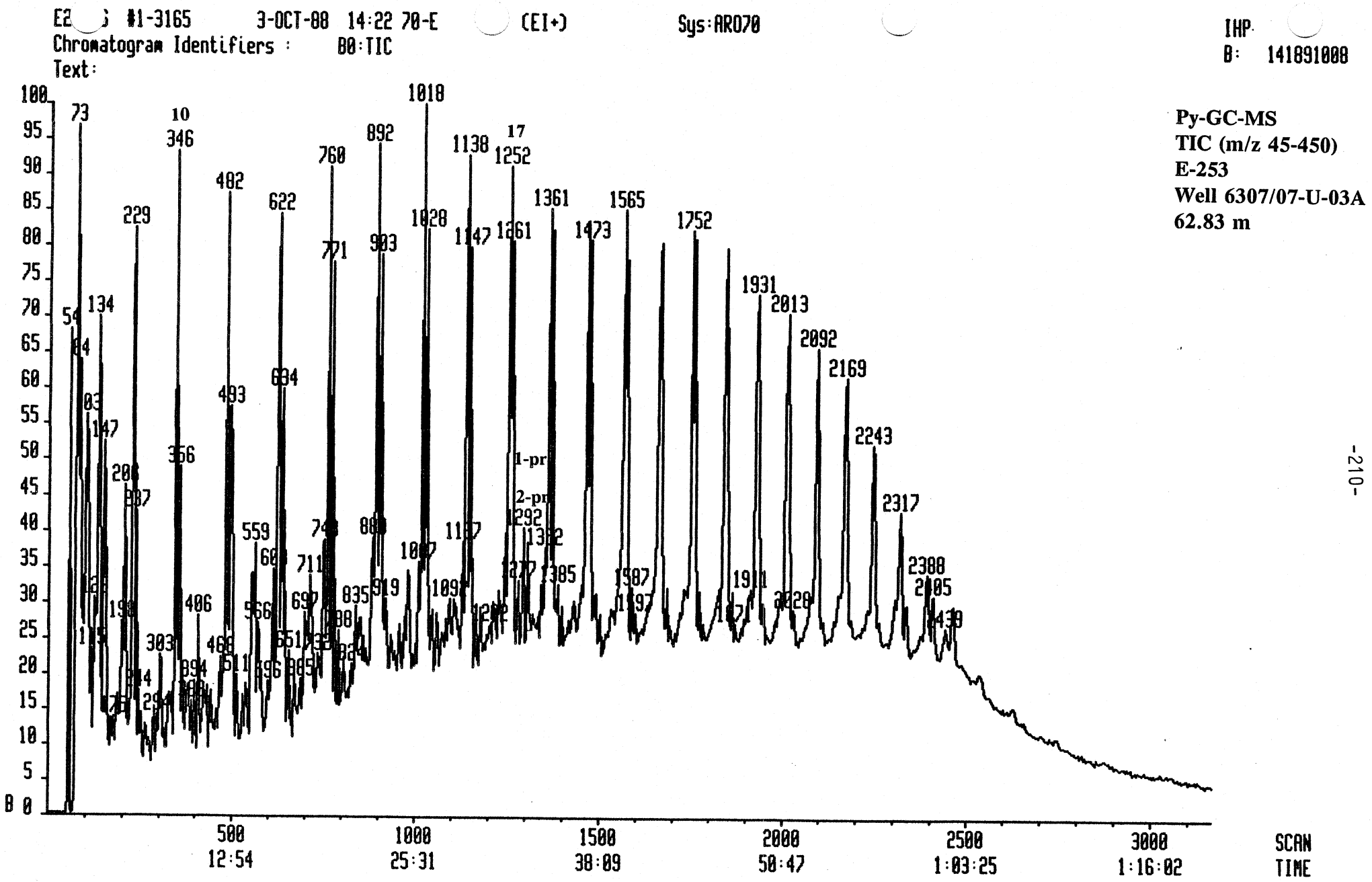

E1 3 #1-3000 5-OCT-88 14:15 70-E (EI+) Sys:AR070
IHP
B: 621187000
Chromatogram Identifiers : 80:TIC
Text:
1-pr
2-pr
B 0
500 12:54
1000 25:32
1500 30:11
2000 50:49
2500 1:03:27
3000 1:16:05
SCAN TIME


E2 #1-3000 6-OCT-88 08:02 70-E (EI+) Sys:AR070
Chromatogram Identifiers : B0:TIC
Text:
IHP
B: 138514000
Py-GC-MS
TIC (m/z 45-450)
E-227
Well 6307/07-U-03A
46.20 m
1-pr
2-pr
B 0
500 12:56
1000 25:34
1500 38:11
2000 50:49
2500 1:03:27
3000 1:16:05
SCAN TIME


E8 G #1-3000 3-OCT-88 12:41 70-E (EI+) Sys:AR070
Chromatogram Identifiers : A :ATIC
Text:
IHP
A: 27892
Py-GC-MS
TIC (m/z 45-450)
E-230
Well 6307/07-U-03A
48.77 m
1-pr
A 0
500
12:56
1000
25:34
1500
30:13
2000
50:51
2500
1:03:29
3000
1:16:07
SCAN
TIME


E[illegible]G #1-3000 6-OCT-88 14:04 70-E (EI+) Sys:AR070
Chromatogram Identifiers : A :ATIC
Text:
IHP
A: 55819
Py-GC-MS
TIC (m/z 45-450)
E-239
Well 6307/07-U-03A
55.26 m
1-pr
2-pr
SCAN
TIME
500 13:00
1000 25:38
1500 38:16
2000 50:54
2500 1:03:32
3000 1:16:09


E S #1-3000 6-OCT-88 09:47 70-E (EI+) Sys:AR070
Chromatogram Identifiers : 80:TIC
Text:
IHP
B: 63523000
Py-GC-MS
TIC (m/z 45-450)
E-249
Well 6307/07-U-03A
60.83 m
1-pr
2-pr
B 0
SCAN
TIME
500
12:54
1000
25:32
1500
30:09
2000
50:47
2500
1:03:25
3000
1:16:03


E2 #1-3165 3-OCT-88 14:22 70-E (EI+) Sys:AR070
Chromatogram Identifiers : B0:TIC
Text:
IHP
B: 141891008
Py-GC-MS
TIC (m/z 45-450)
E-253
Well 6307/07-U-03A
62.83 m
1-pr
2-pr
SCAN
TIME
500
12:54
1000
25:31
1500
38:09
2000
50:47
2500
1:03:25
3000
1:16:02

IKU SINTEF-GRUPPEN

Figure III.5.6b

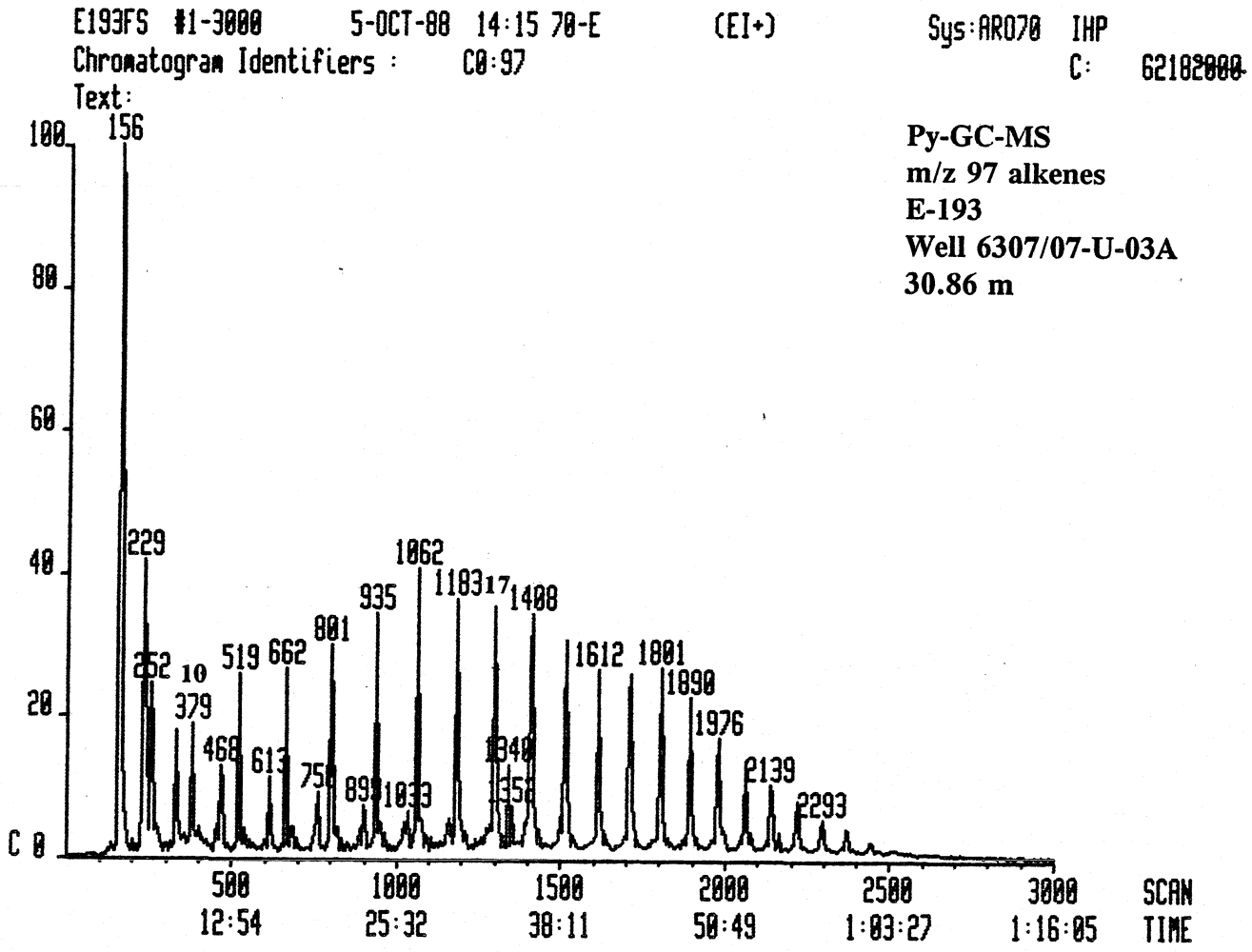
PY-GC-MS

of

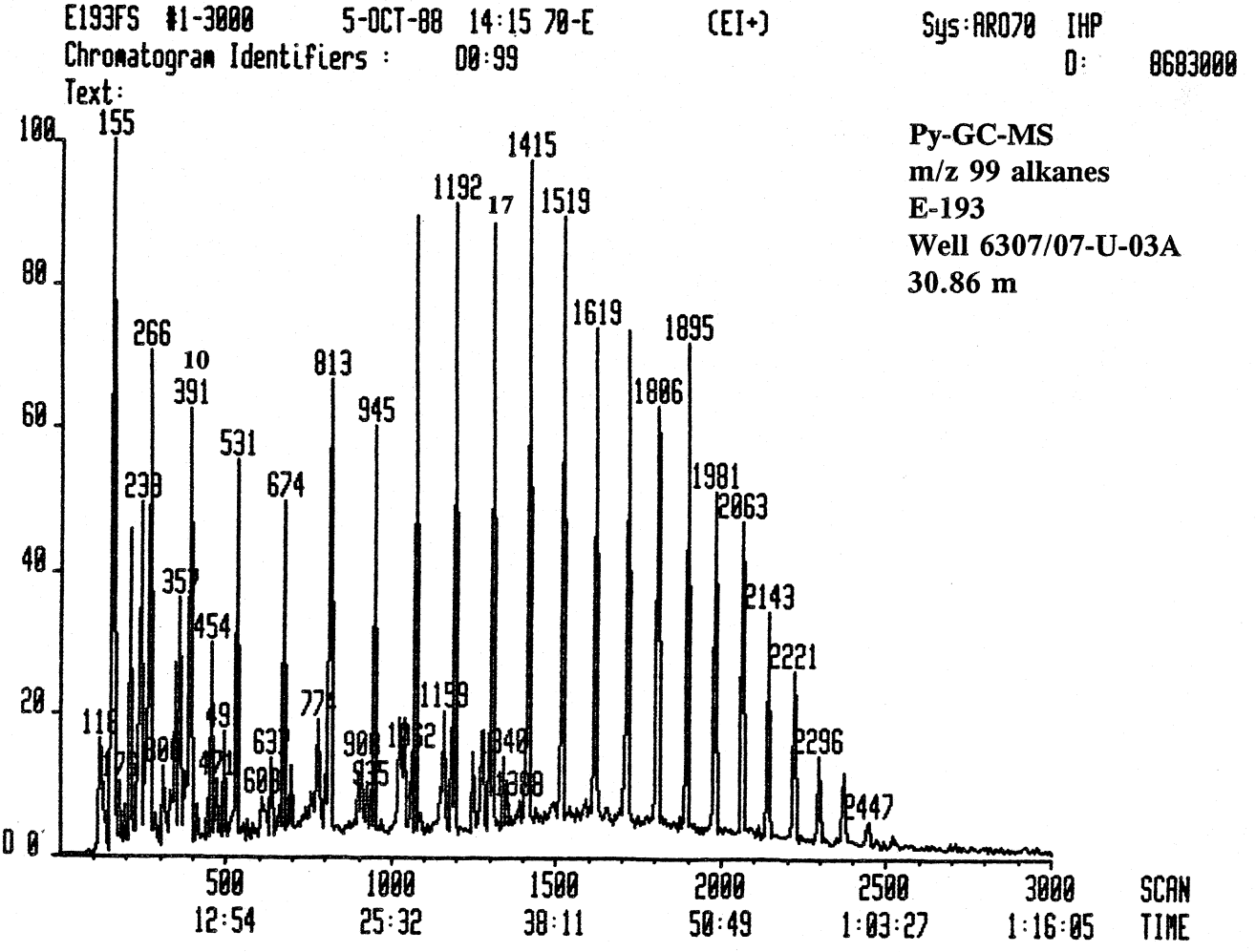
kerogens

m/z 97,99

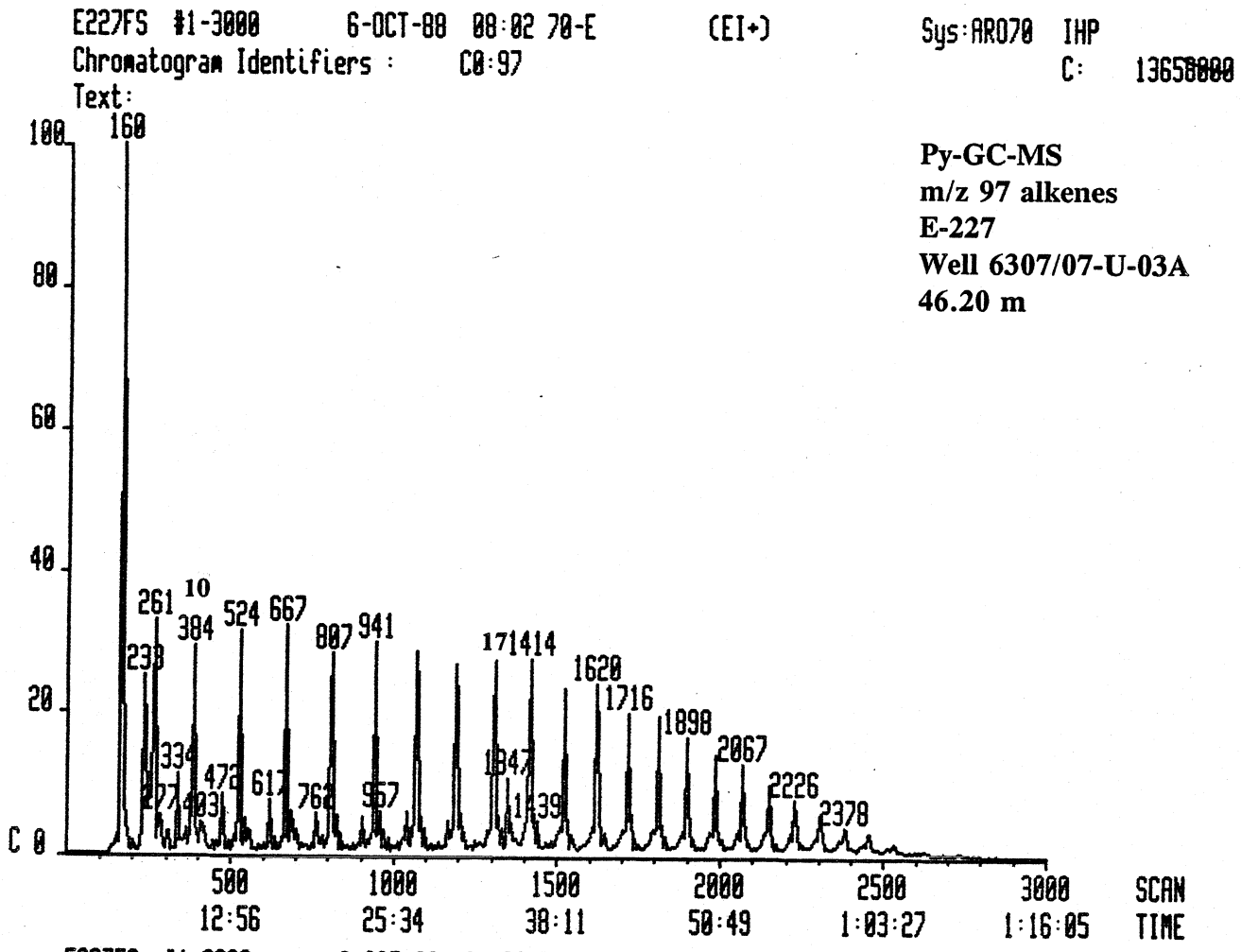
(Further identification of peaks, see section II)



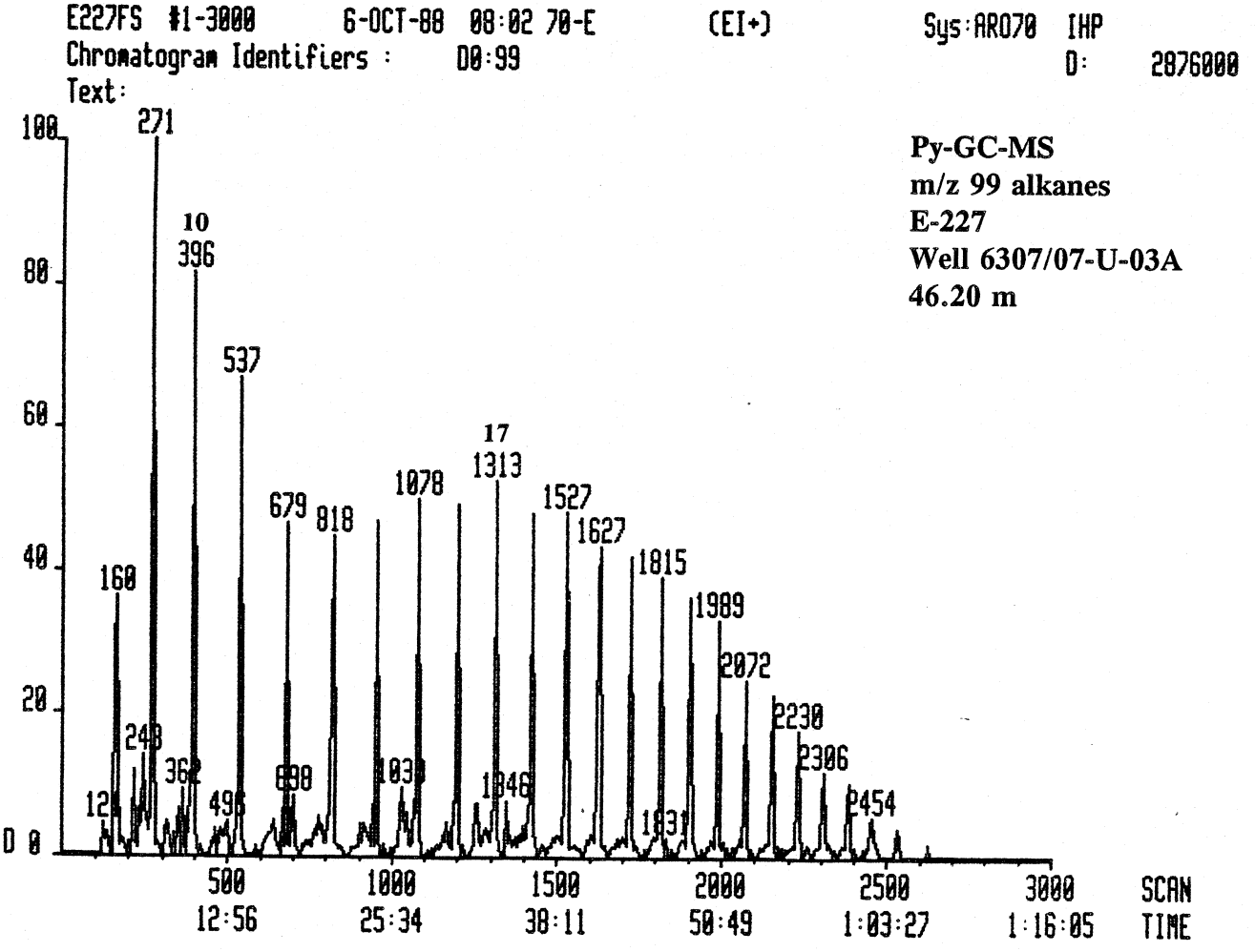
Py-GC-MS
m/z 97 alkenes
E-193
Well 6307/07-U-03A
30.86 m



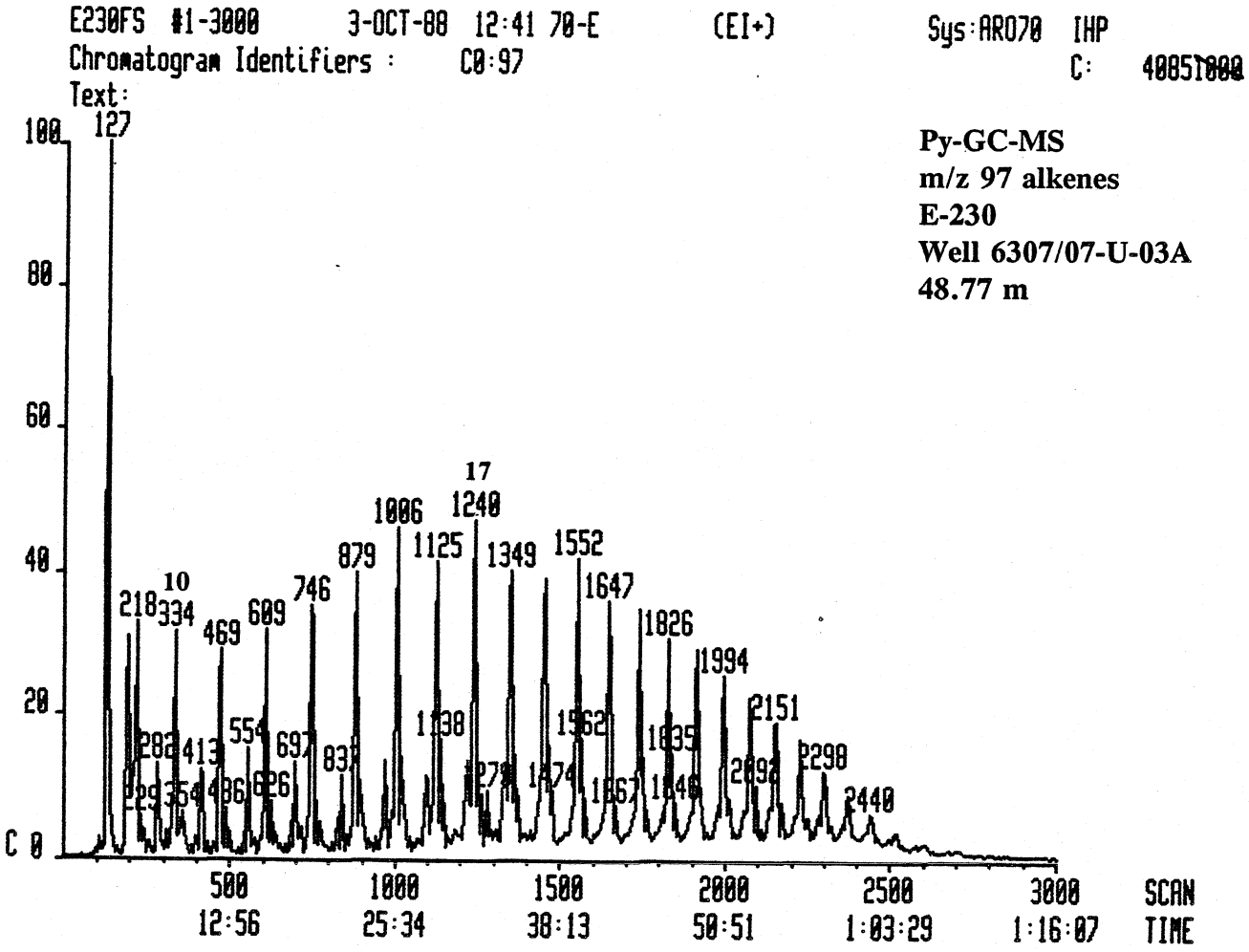
Py-GC-MS
m/z 99 alkanes
E-193
Well 6307/07-U-03A
30.86 m

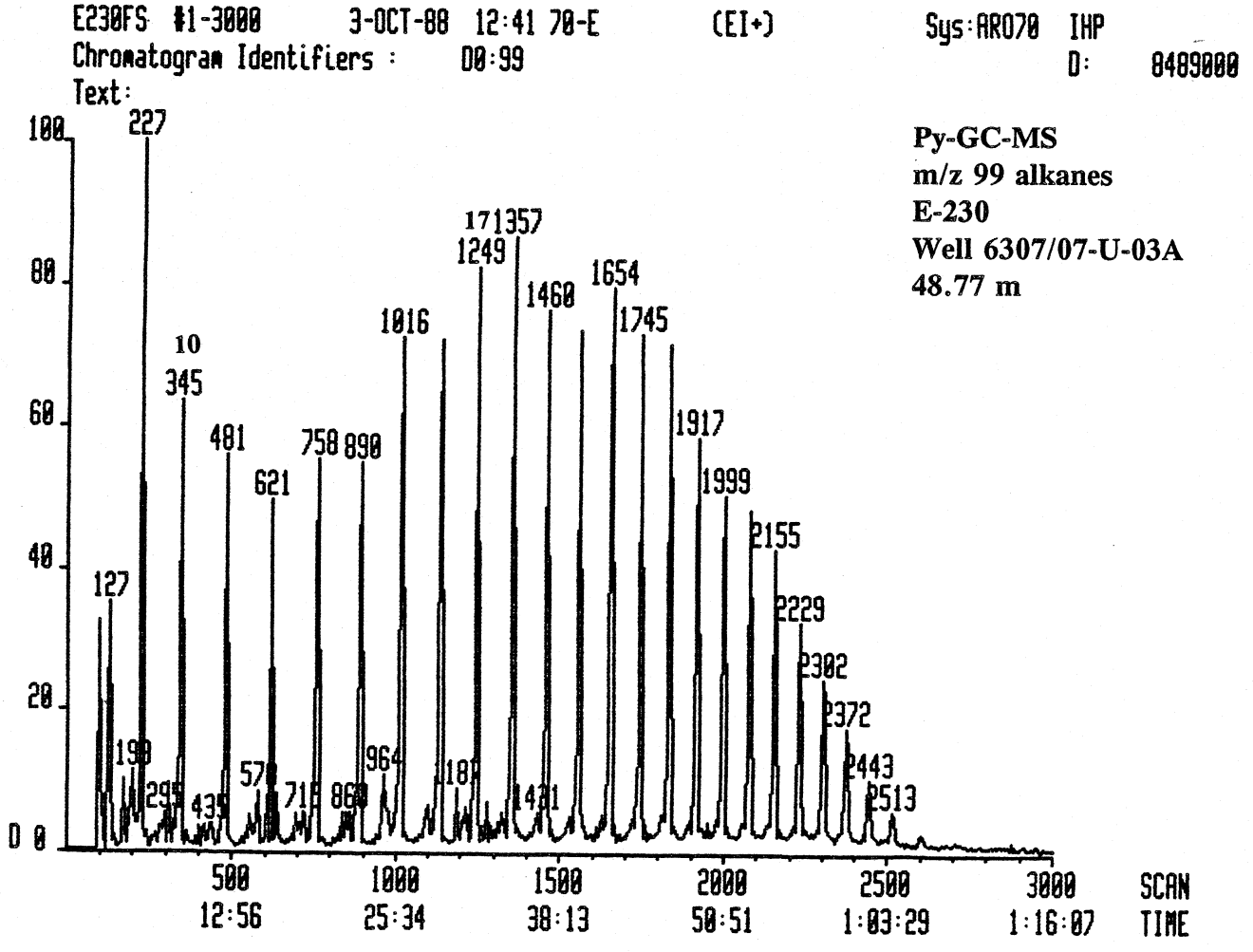


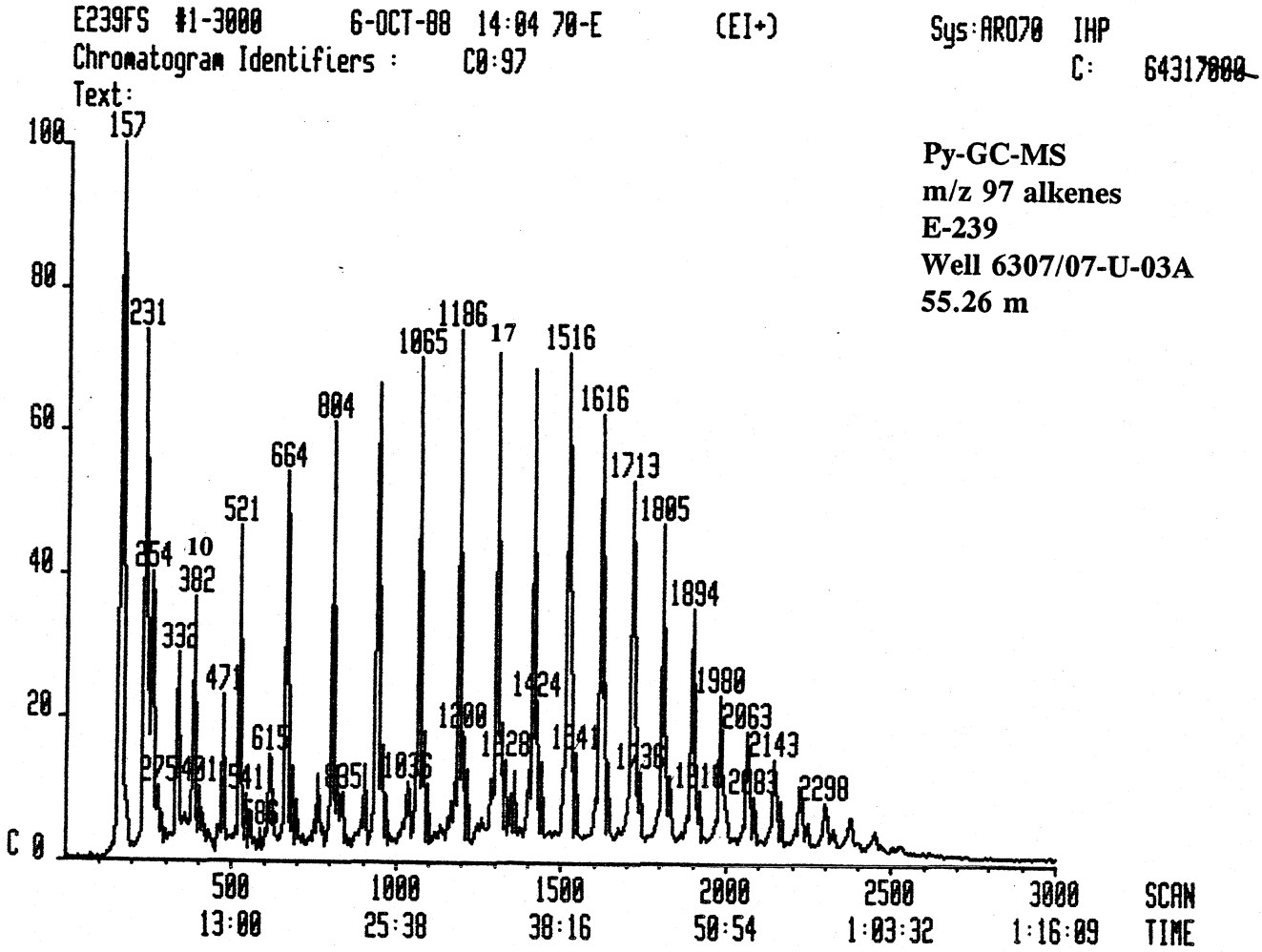
Py-GC-MS
m/z 97 alkenes
E-227
Well 6307/07-U-03A
46.20 m

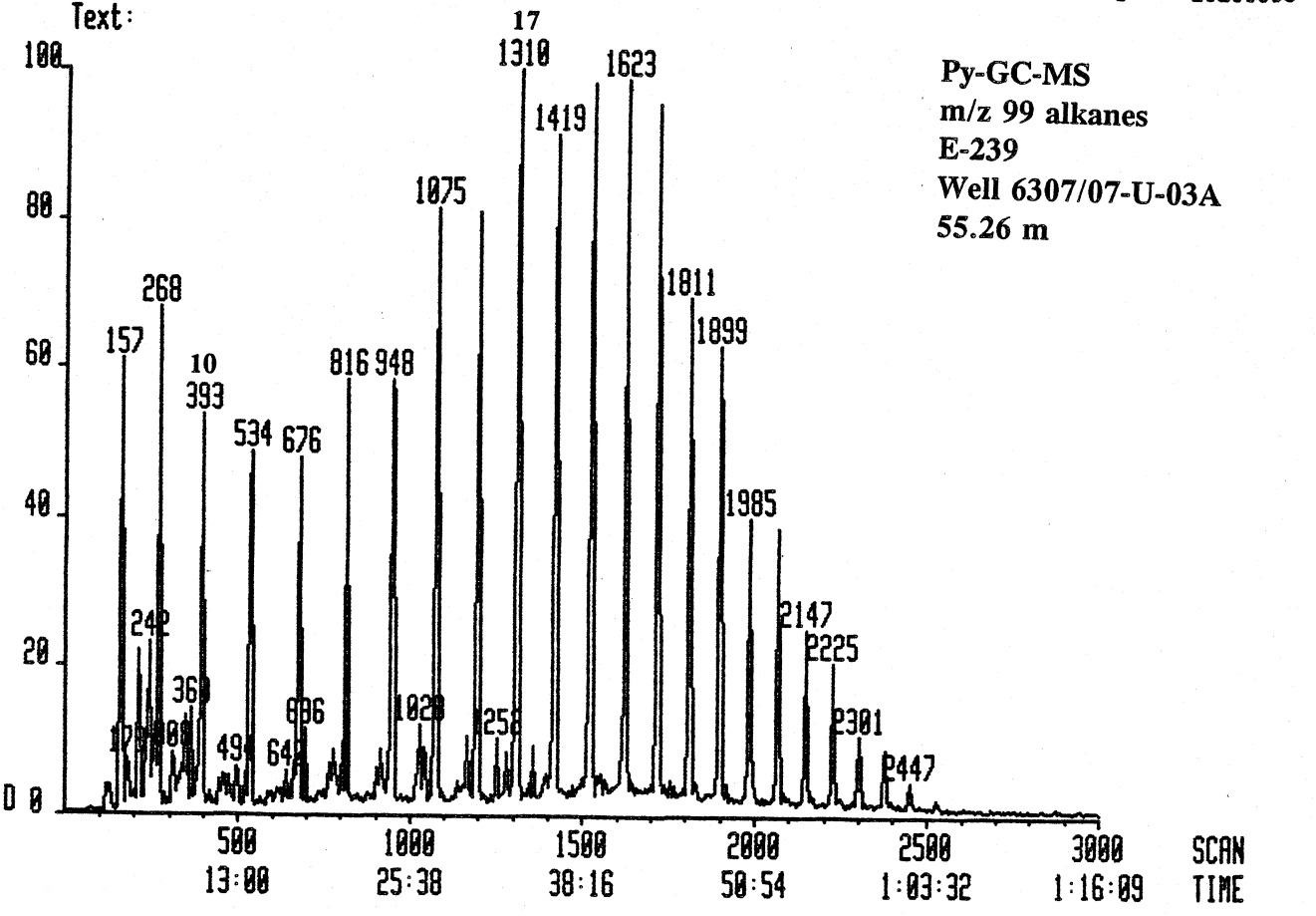


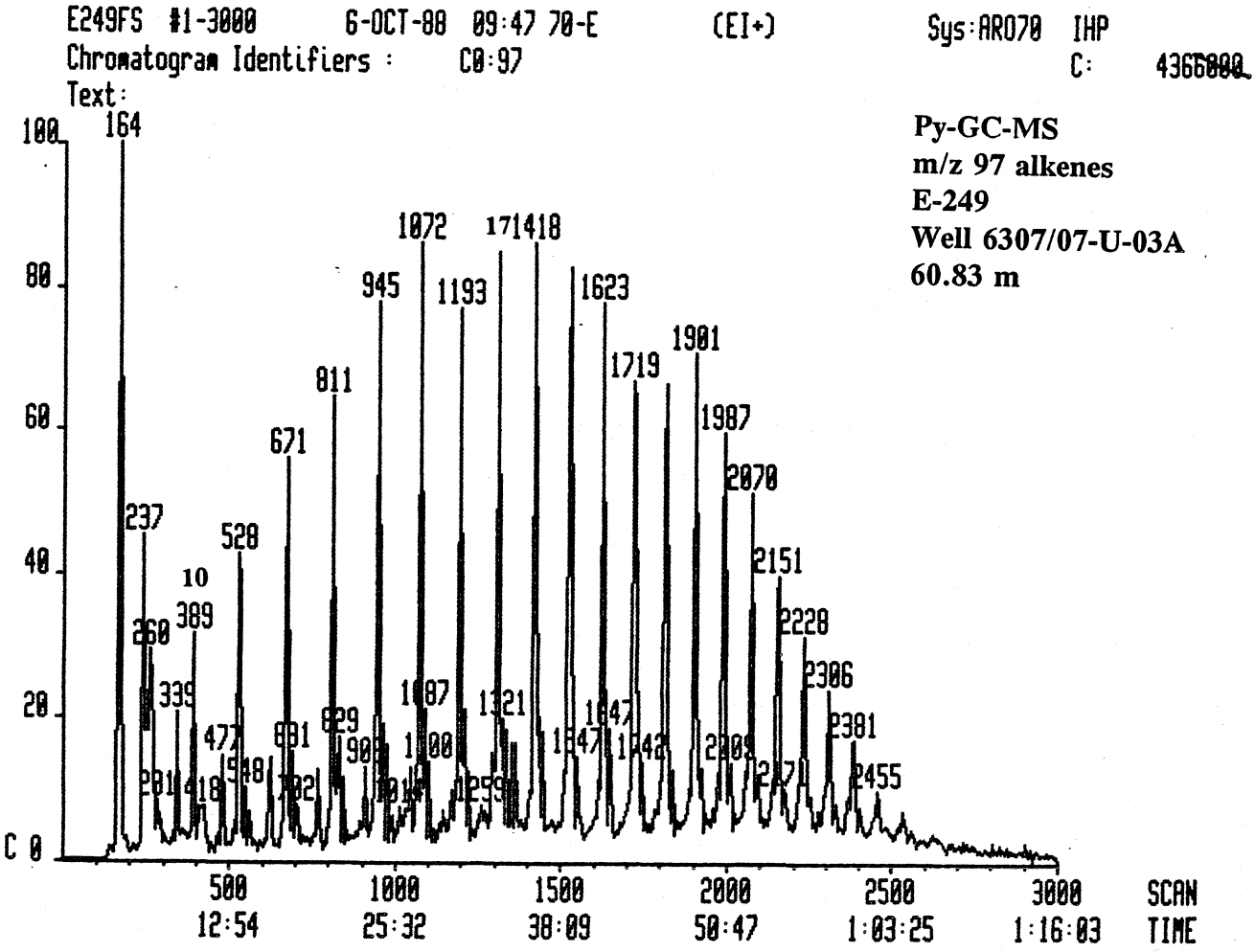
Py-GC-MS
m/z 99 alkanes
E-227
Well 6307/07-U-03A
46.20 m

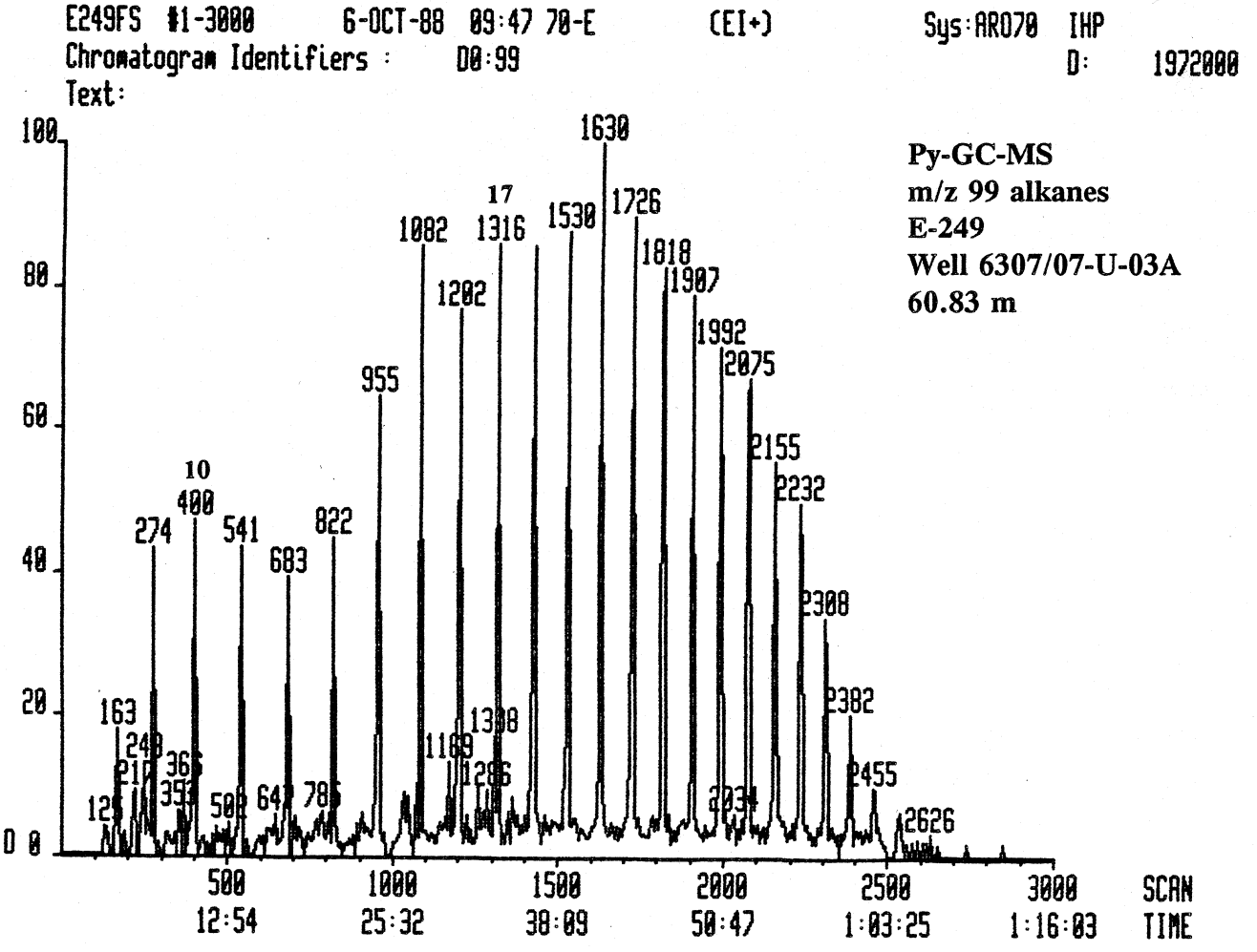

E230FS #1-3000 3-OCT-88 12:41 70-E (EI+)
Chromatogram Identifiers : C0:97
Text:
Sys:AR070 IHP
C: 40851000
Py-GC-MS
m/z 97 alkenes
E-230
Well 6307/07-U-03A
48.77 m
100
80
60
40
20
C 0
127
10
218
334
469
609
746
879
1006
17
1240
1125
1349
1552
1647
1826
1994
2151
2298
2440
500
1000
1500
2000
2500
3000
12:56
25:34
38:13
50:51
1:03:29
1:16:07
SCAN
TIME

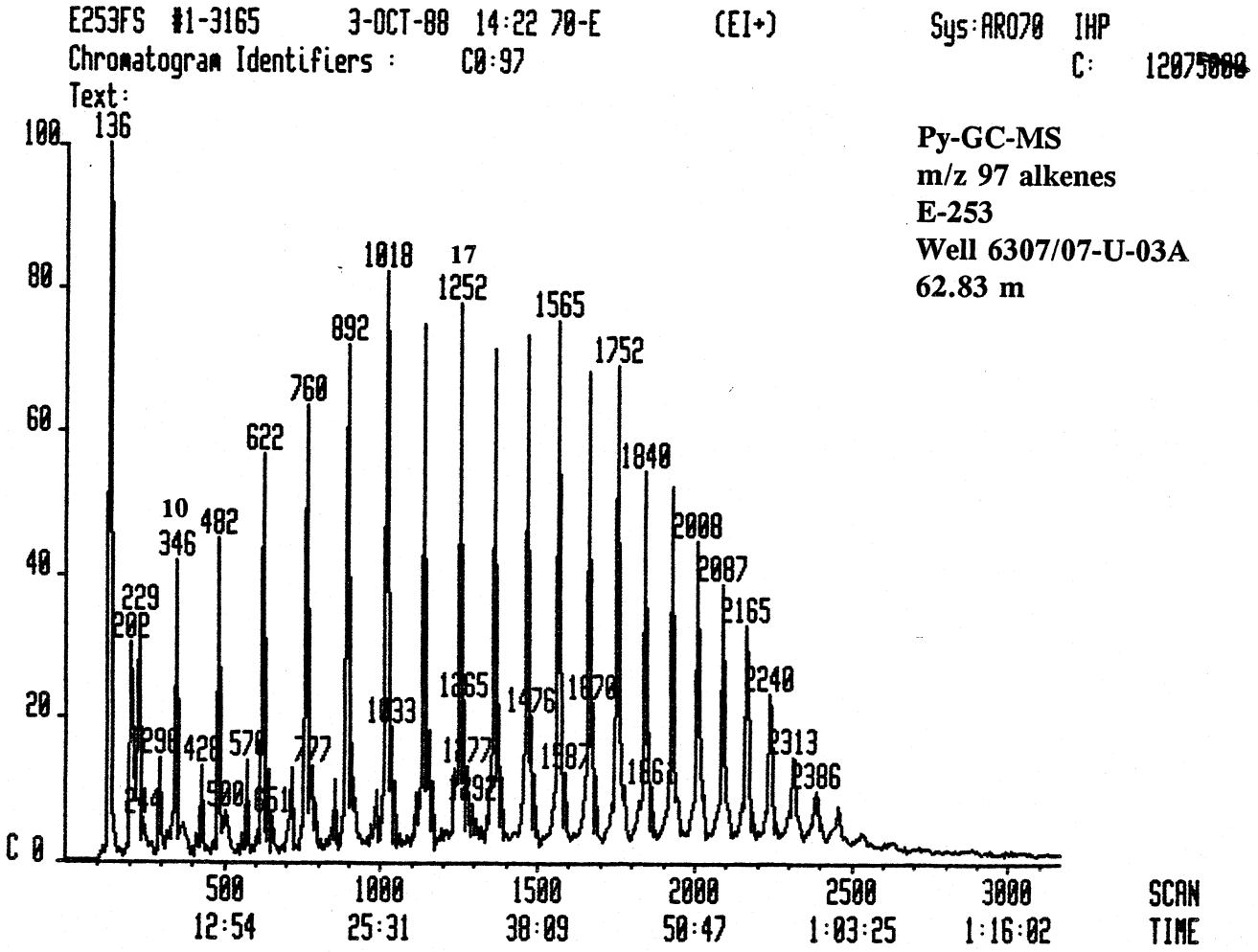

E230FS #1-3000 3-OCT-88 12:41 70-E (EI+)
Chromatogram Identifiers : D0:99
Text:
Sys:AR070 IHP
D: 8489000
Py-GC-MS
m/z 99 alkanes
E-230
Well 6307/07-U-03A
48.77 m
100
80
60
40
20
D 0
227
10
345
481
621
758
890
1016
171357
1249
1460
1654
1745
1917
1999
2155
2229
2302
2372
2443
2513
127
500
1000
1500
2000
2500
3000
12:56
25:34
38:13
50:51
1:03:29
1:16:07
SCAN
TIME

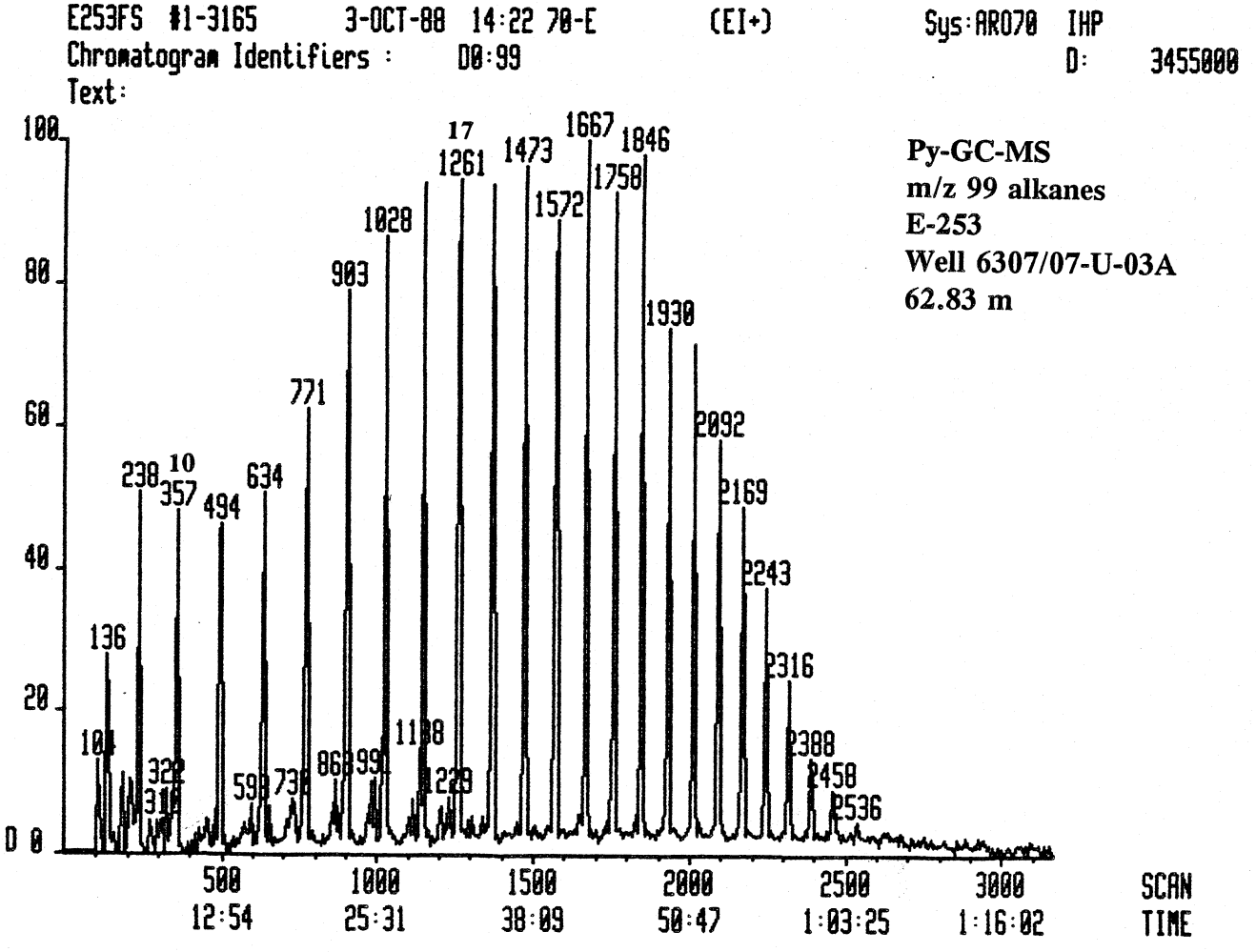

E239FS #1-3000 6-OCT-88 14:04 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : C0:97
C: 64317000
Text:
Py-GC-MS
m/z 97 alkenes
E-239
Well 6307/07-U-03A
55.26 m
C 0
SCAN
TIME

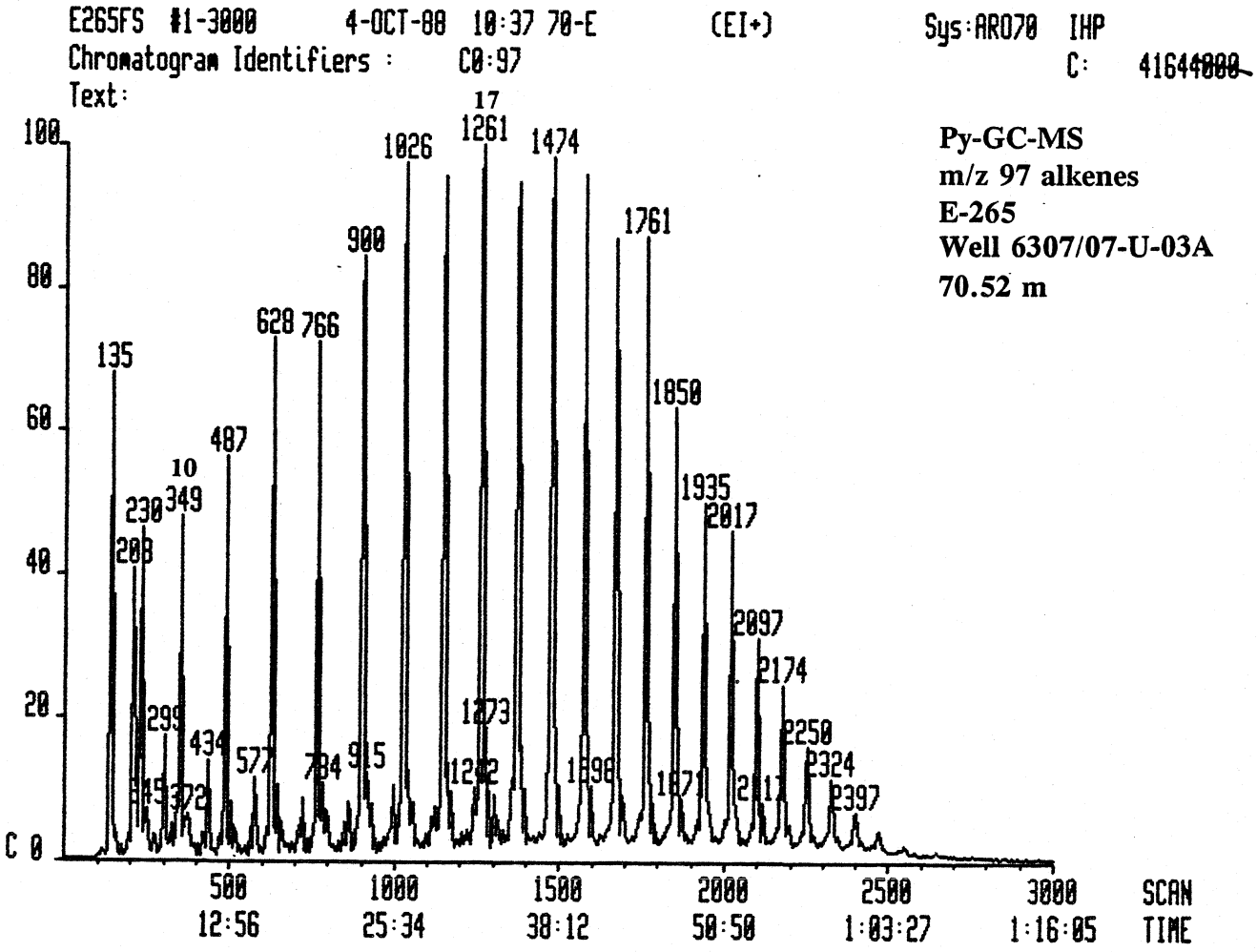

E239FS #1-3000 6-OCT-88 14:04 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : D0:99
D: 21255000
Text:
Py-GC-MS
m/z 99 alkanes
E-239
Well 6307/07-U-03A
55.26 m
D 0
SCAN
TIME

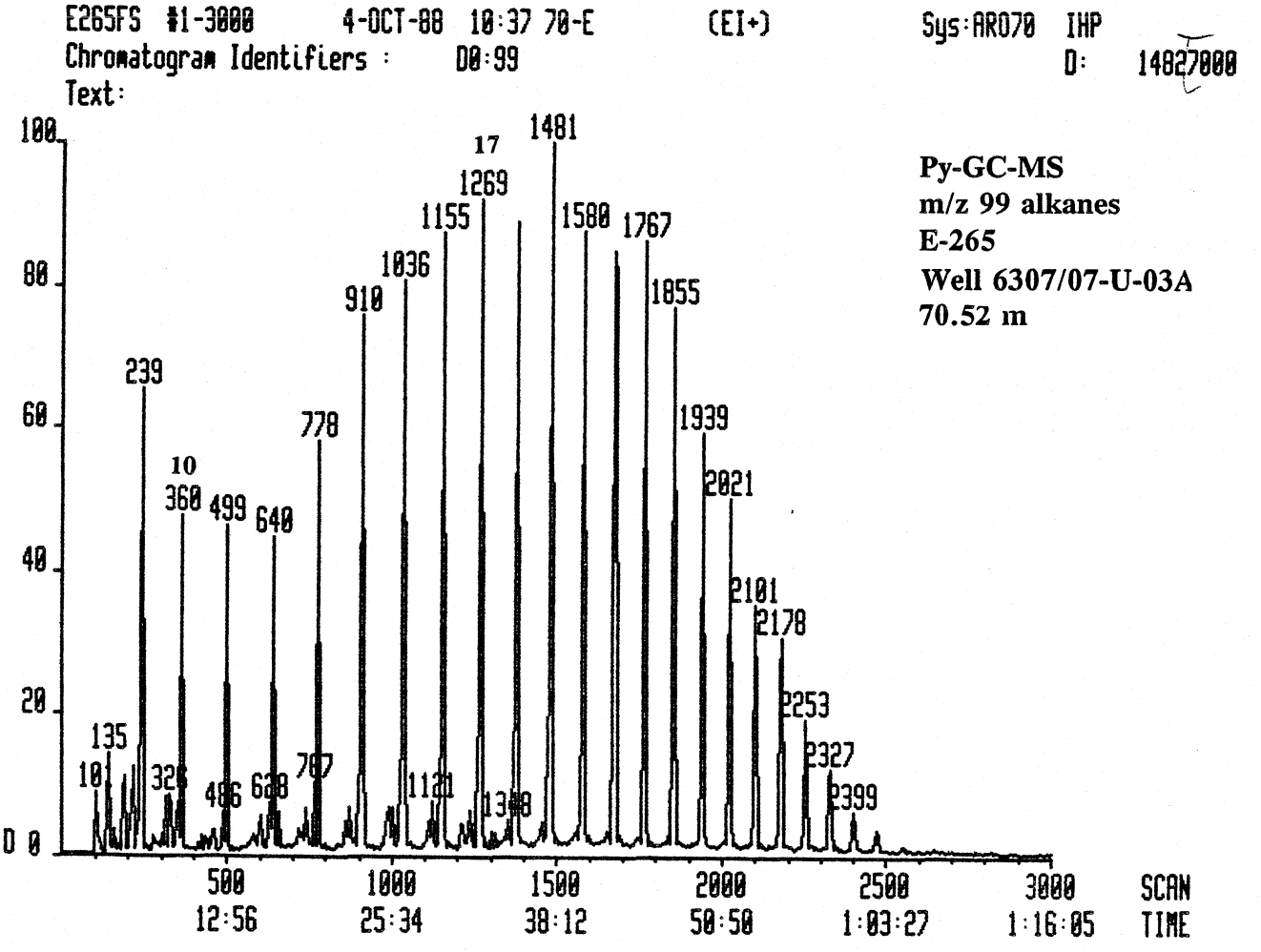

E249FS #1-3000 6-OCT-88 09:47 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : C0:97
C: 4366000
Text:
Py-GC-MS
m/z 97 alkenes
E-249
Well 6307/07-U-03A
60.83 m
SCAN
TIME


E249FS #1-3000 6-OCT-88 09:47 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : D0:99
D: 1972000
Text:
Py-GC-MS
m/z 99 alkanes
E-249
Well 6307/07-U-03A
60.83 m
SCAN
TIME


E253FS #1-3165 3-OCT-88 14:22 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:97 C: 12075000
Text:
Py-GC-MS
m/z 97 alkenes
E-253
Well 6307/07-U-03A
62.83 m
100
80
60
40
20
C 0
136
1018
17
1252
892
1565
760
1752
622
1840
10
346
482
2008
2087
229
2165
2240
2313
2386
500
1000
1500
2000
2500
3000
12:54
25:31
38:09
50:47
1:03:25
1:16:02
SCAN
TIME


E253FS #1-3165 3-OCT-88 14:22 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : D0:99 D: 3455000
Text:
Py-GC-MS
m/z 99 alkanes
E-253
Well 6307/07-U-03A
62.83 m
100
80
60
40
20
D 0
17
1261
1473
1667
1846
1758
1572
1028
903
1930
771
2092
10
238
357
494
634
2169
2243
136
2316
2388
2458
2536
500
1000
1500
2000
2500
3000
12:54
25:31
38:09
50:47
1:03:25
1:16:02
SCAN
TIME


E265FS #1-3000 4-OCT-88 10:37 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : C0:97
C: 41644000
Text:
Py-GC-MS
m/z 97 alkenes
E-265
Well 6307/07-U-03A
70.52 m
C 0
SCAN
TIME


E265FS #1-3000 4-OCT-88 10:37 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : D0:99
D: 14827000
Text:
Py-GC-MS
m/z 99 alkanes
E-265
Well 6307/07-U-03A
70.52 m
D 0
SCAN
TIME

IKU SINTEF-GRUPPEN

Figure III.5.6c

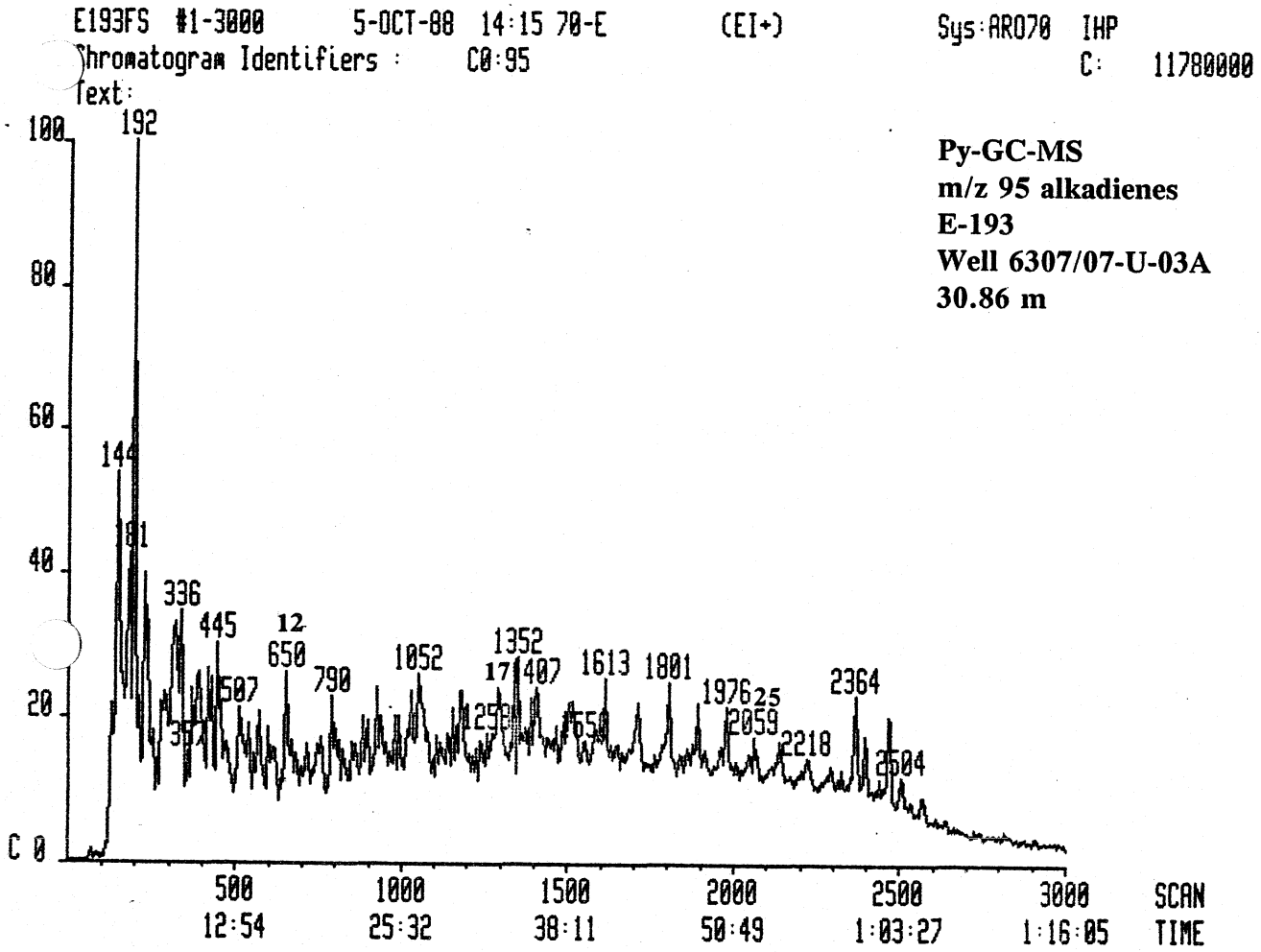
PY-GC-MS

of

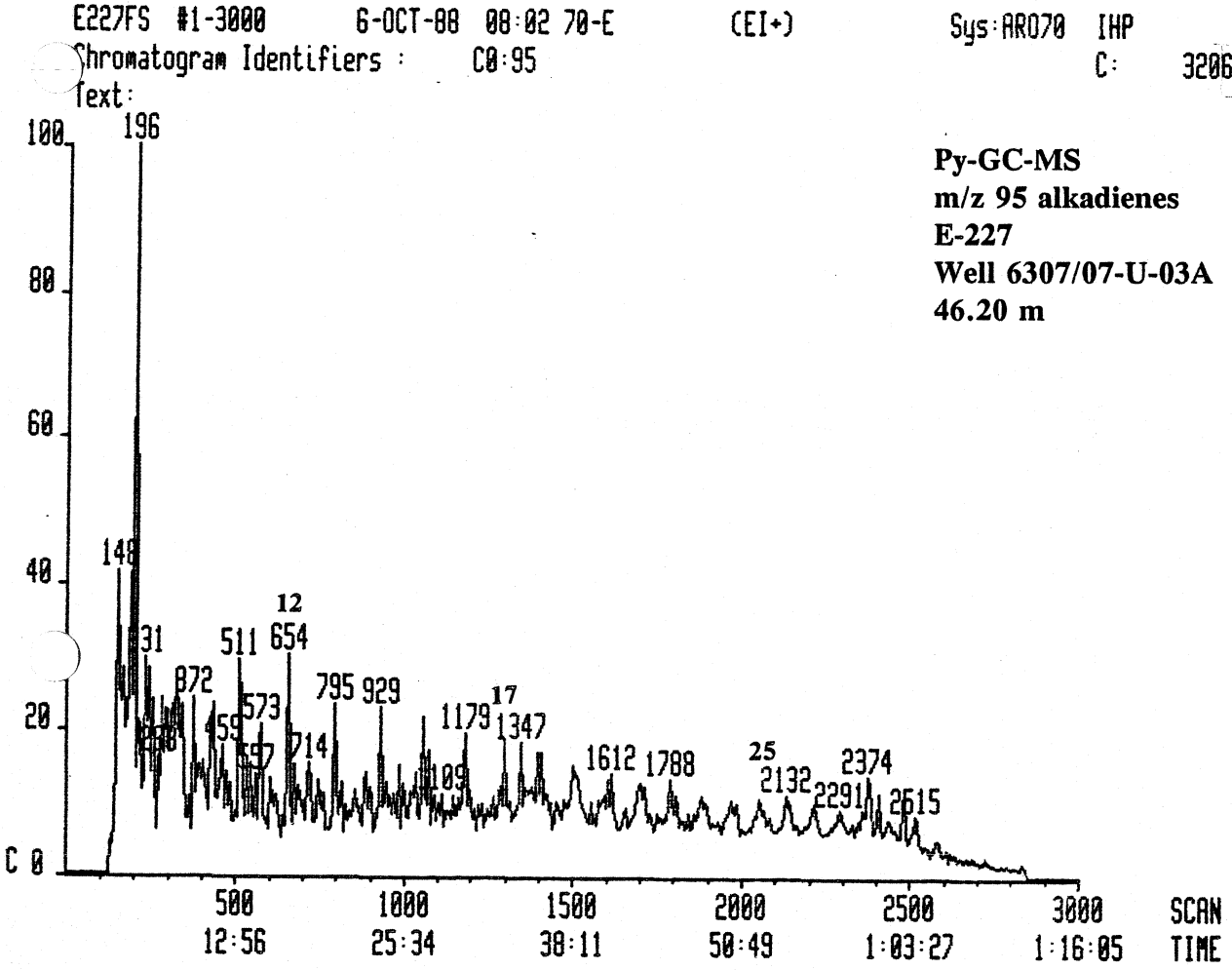
kerogens

m/z 95

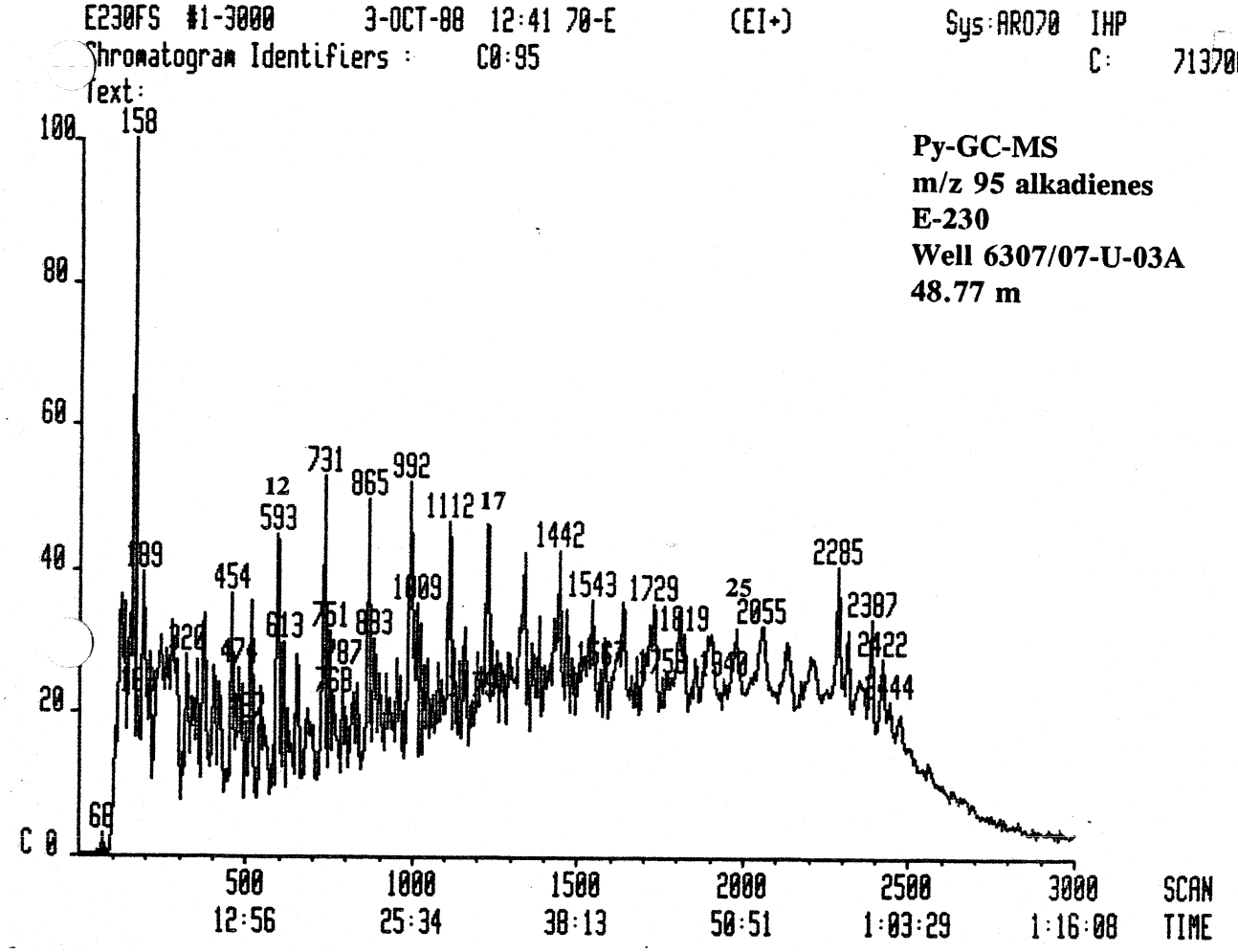
(Further identification of peaks, see section II)

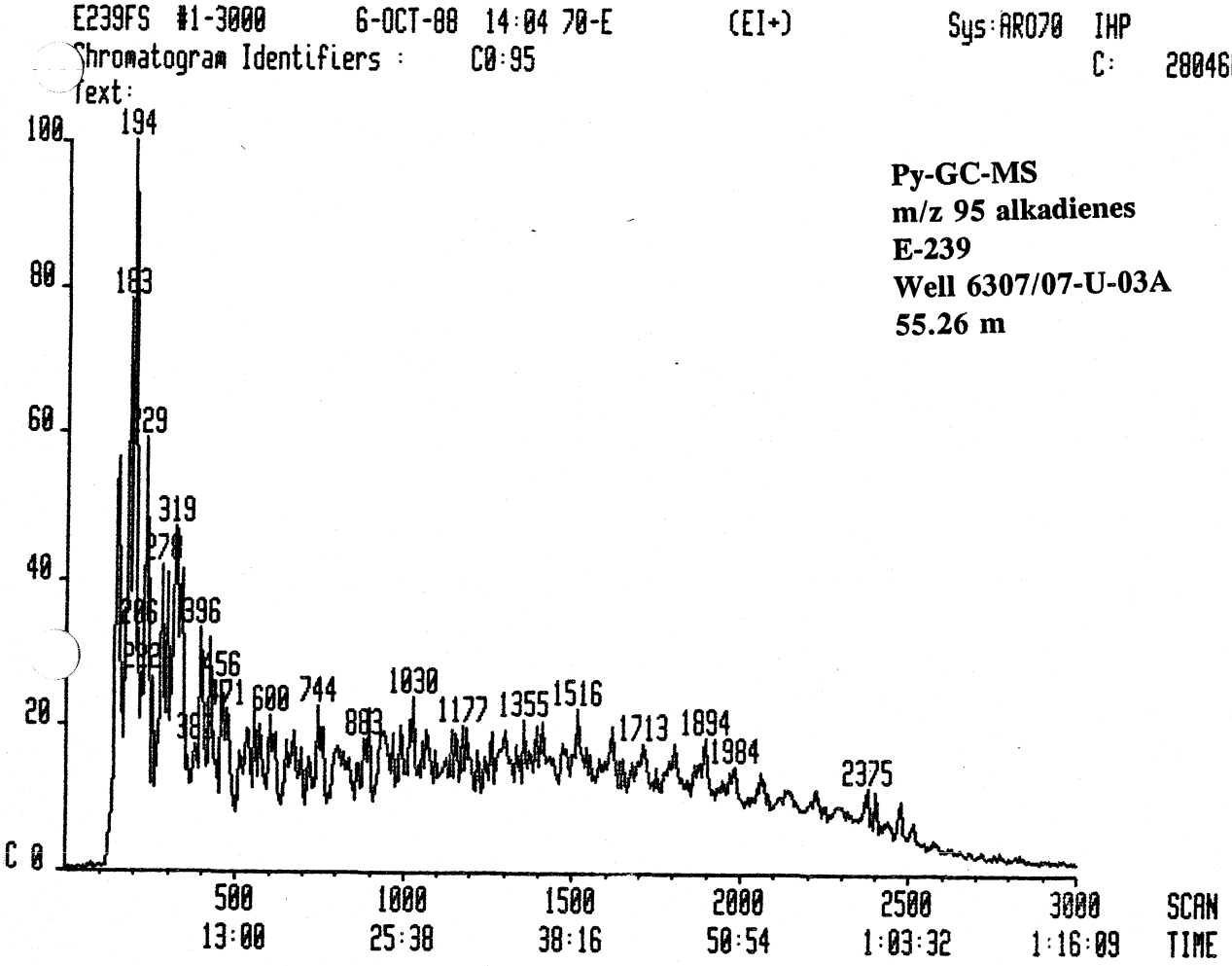


Py-GC-MS
m/z 95 alkadienes
E-193
Well 6307/07-U-03A
30.86 m

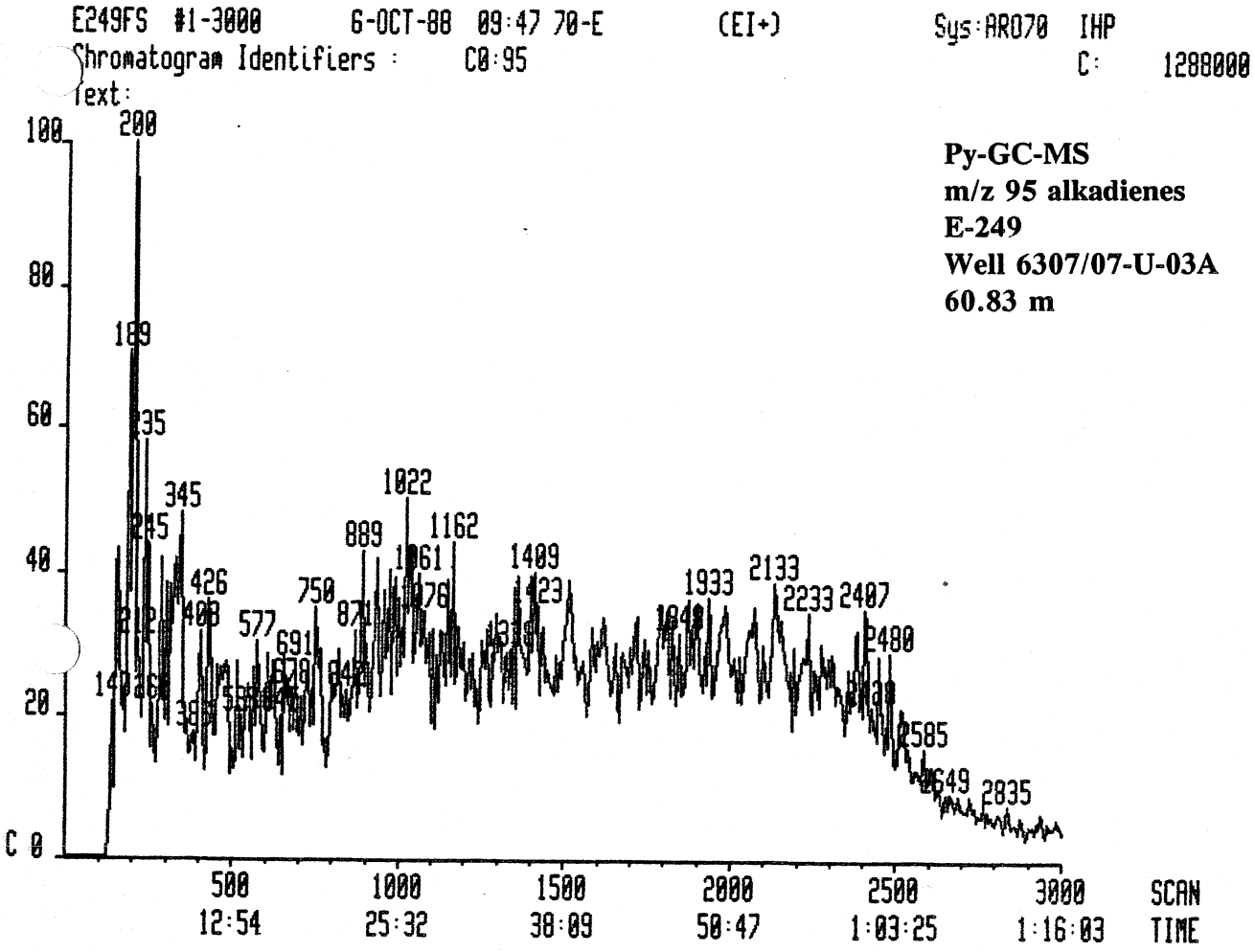


Py-GC-MS
m/z 95 alkadienes
E-227
Well 6307/07-U-03A
46.20 m

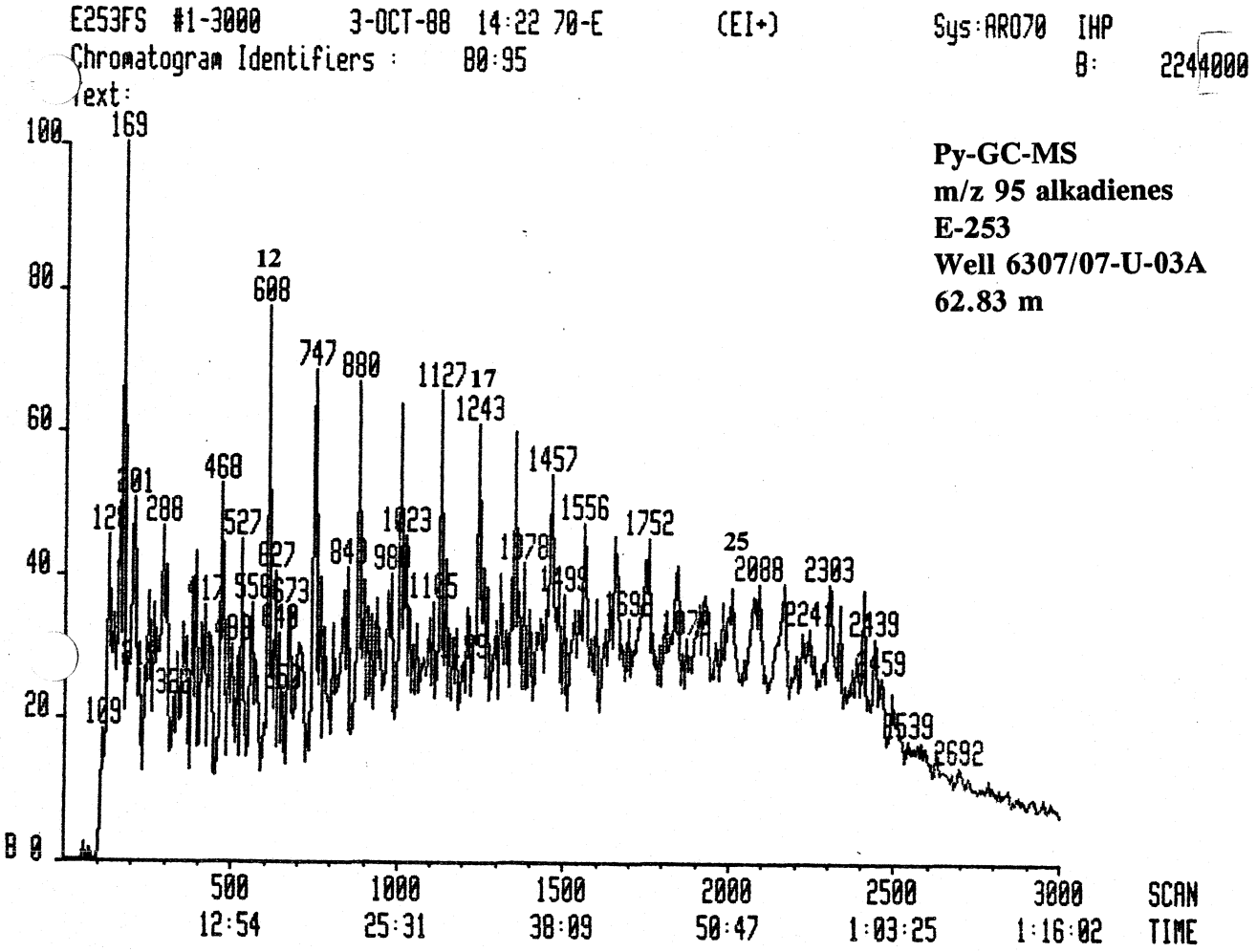

E230FS #1-3000 3-OCT-88 12:41 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:95 C: 7137000
Text:
Py-GC-MS
m/z 95 alkadienes
E-230
Well 6307/07-U-03A
48.77 m
100
80
60
40
20
C 0
158
731
865
992
1112
1442
1543
1729
2285
2387
2422
2055
593
454
1009
500
1000
1500
2000
2500
3000
12:56
25:34
38:13
50:51
1:03:29
1:16:08
SCAN
TIME



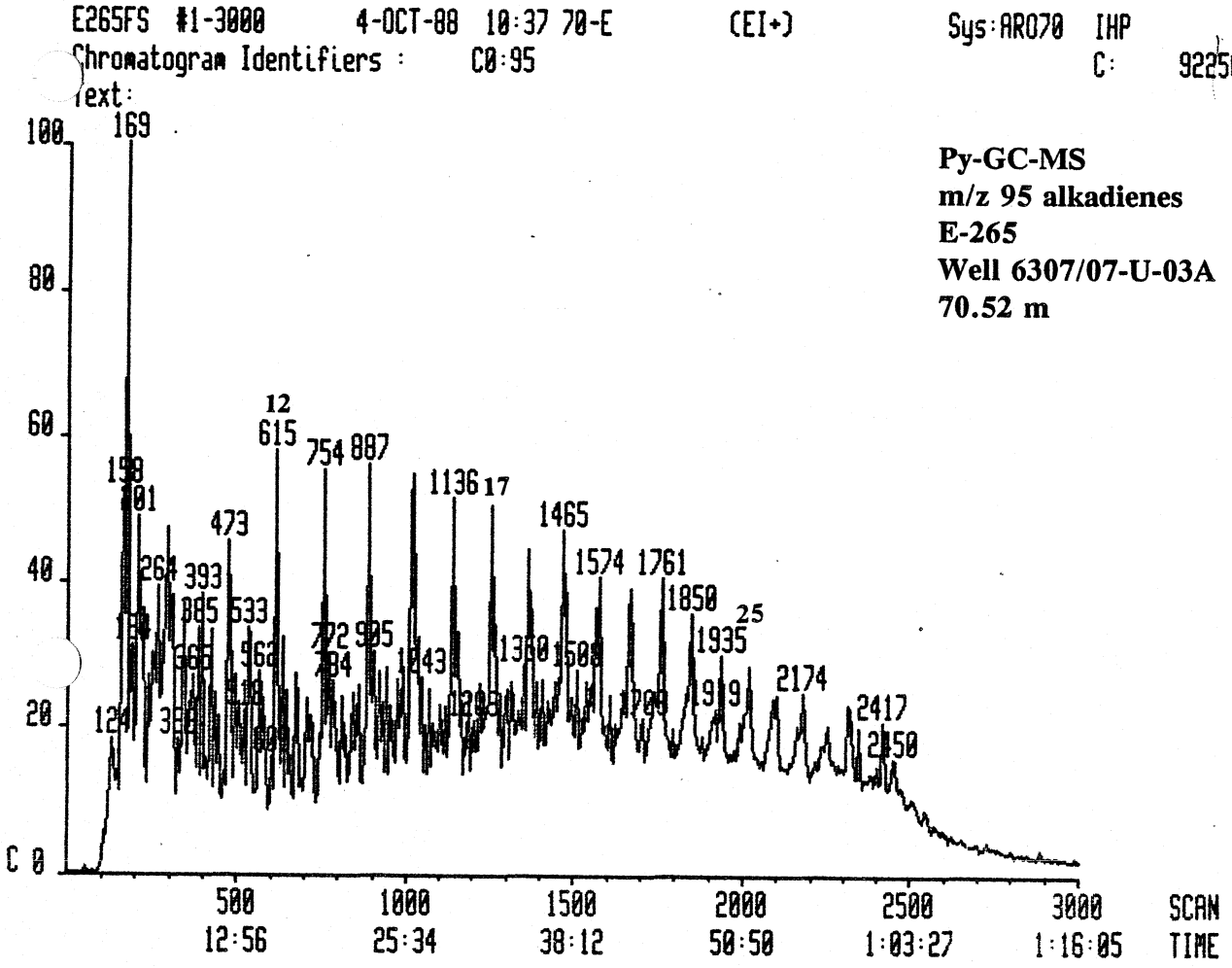
Py-GC-MS
m/z 95 alkadienes
E-239
Well 6307/07-U-03A
55.26 m



Py-GC-MS
m/z 95 alkadienes
E-249
Well 6307/07-U-03A
60.83 m



Py-GC-MS
m/z 95 alkadienes
E-253
Well 6307/07-U-03A
62.83 m


E265FS #1-3000 4-OCT-88 10:37 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:95 C: 9225000
Text:
Py-GC-MS
m/z 95 alkadienes
E-265
Well 6307/07-U-03A
70.52 m
100
80
60
40
20
C 0
169
12
615
754
887
1136
17
1465
1574
1761
1850
1935
25
2174
2417
473
393
533
500
1000
1500
2000
2500
3000
SCAN
12:56
25:34
38:12
50:50
1:03:27
1:16:05
TIME

IKU SINTEF-GRUPPEN

Figure III.5.6d

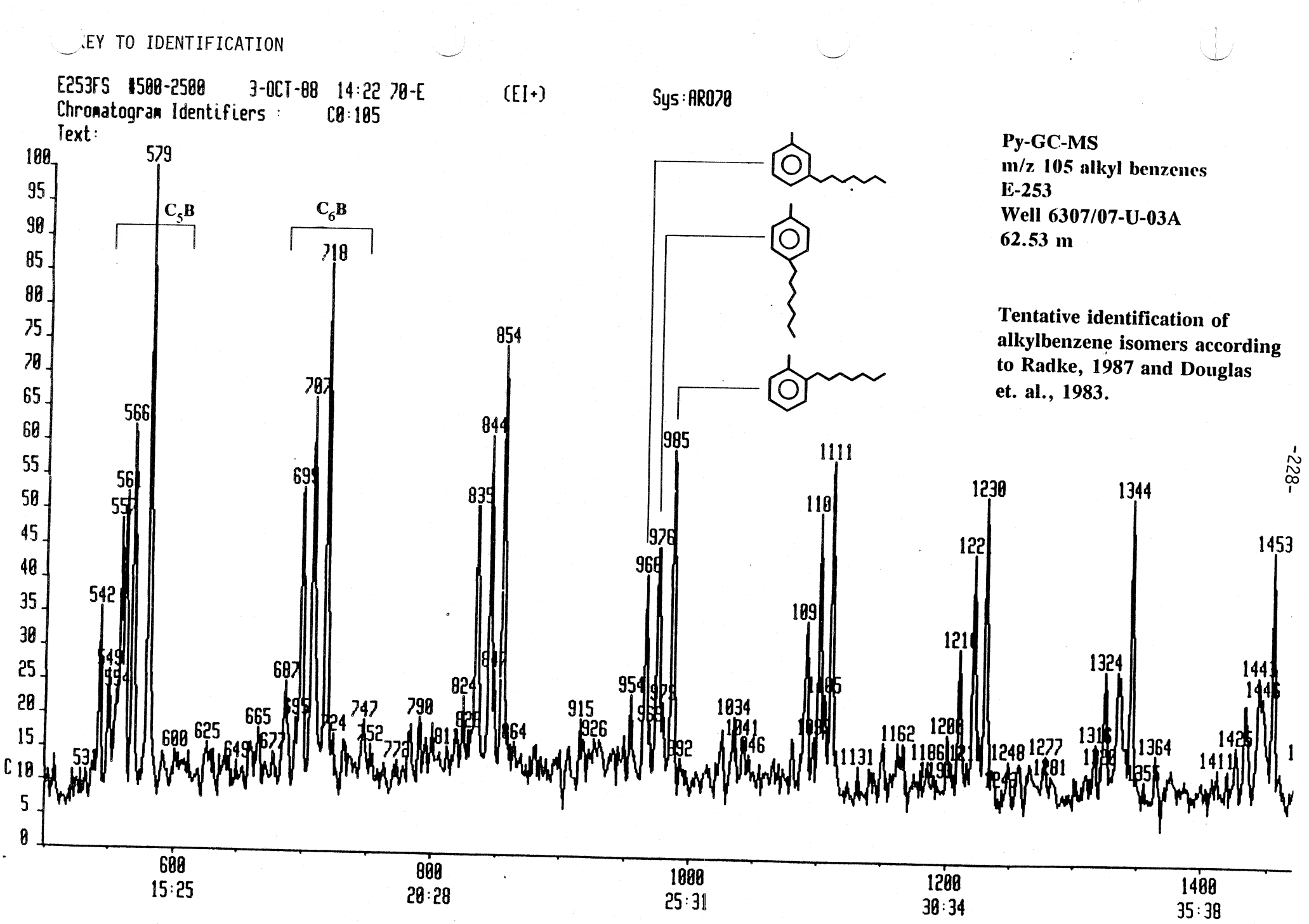
PY-GC-MS

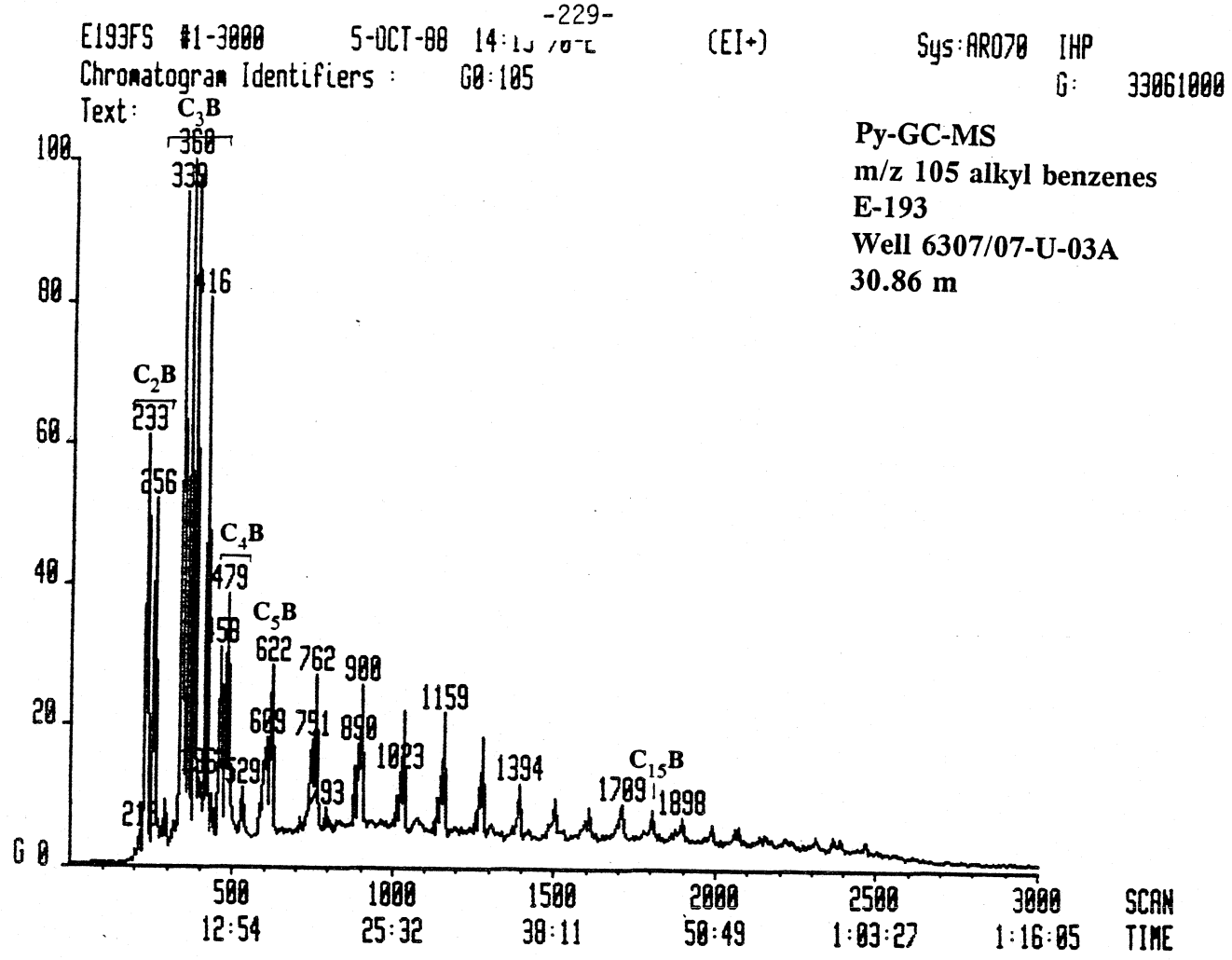
of

kerogens

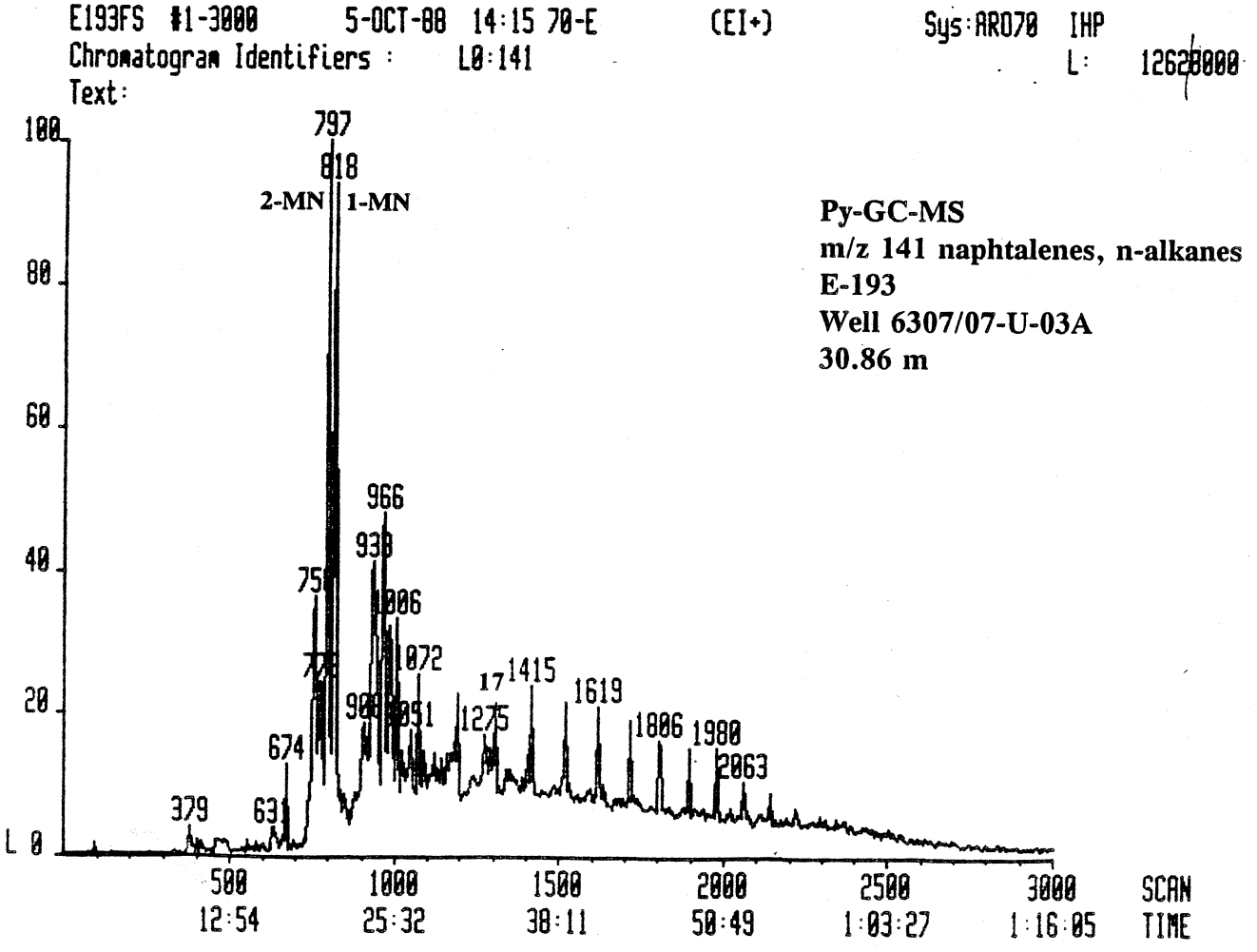
m/z 105, 141

(Further identification of peaks, see section II)

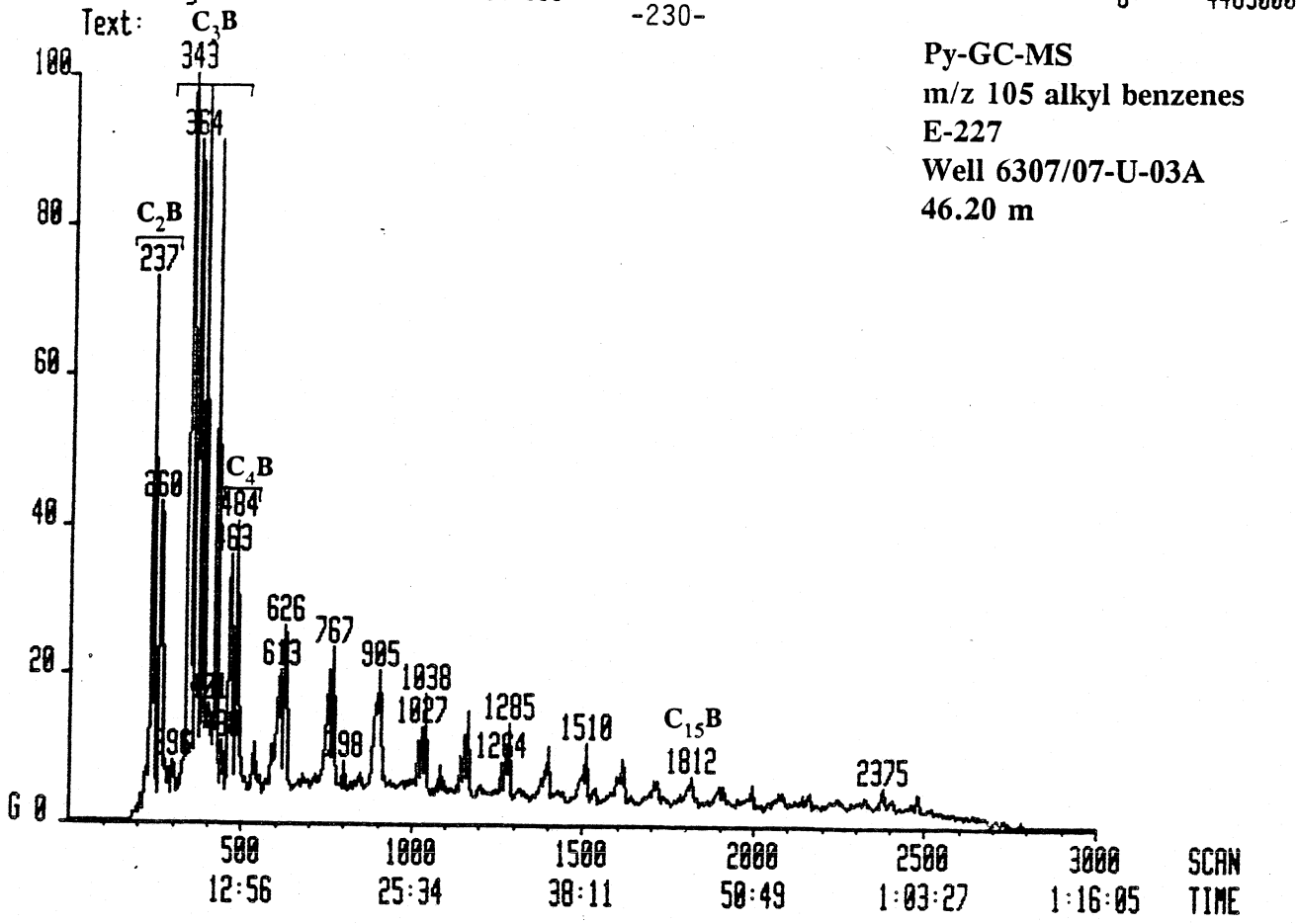

KEY TO IDENTIFICATION
E253FS #500-2500 3-OCT-88 14:22 70-E (EI+) Sys:AR070
Chromatogram Identifiers : C0:105
Text:
C5B
C6B
579
718
707
566
542
854
844
839
985
976
968
1111
1230
1344
1453
122
118
109
1324
1214
Py-GC-MS
m/z 105 alkyl benzenes
E-253
Well 6307/07-U-03A
62.53 m
Tentative identification of alkylbenzene isomers according to Radke, 1987 and Douglas et. al., 1983.
-228-
600
15:25
800
20:28
1000
25:31
1200
30:34
1400
35:38



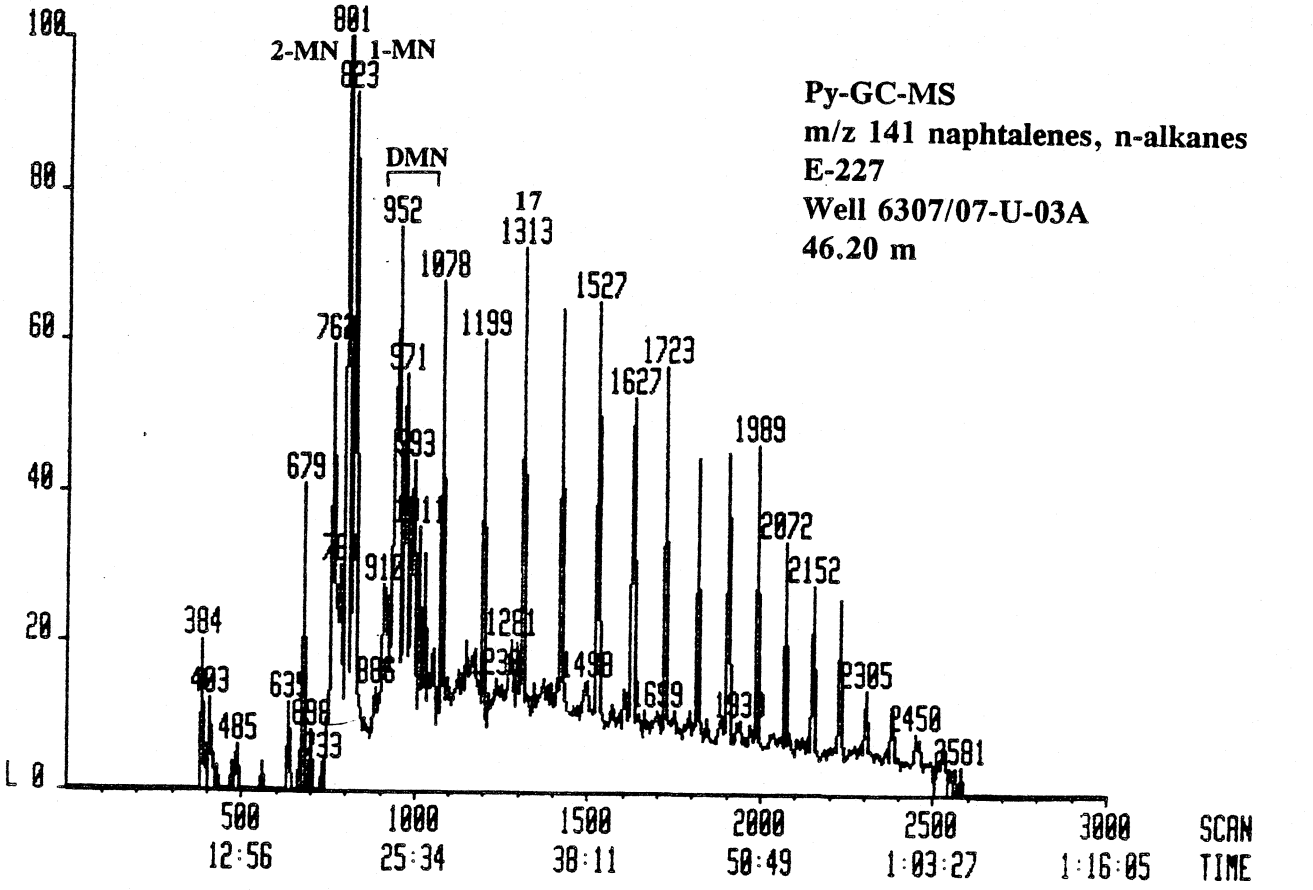
Py-GC-MS
m/z 105 alkyl benzenes
E-193
Well 6307/07-U-03A
30.86 m



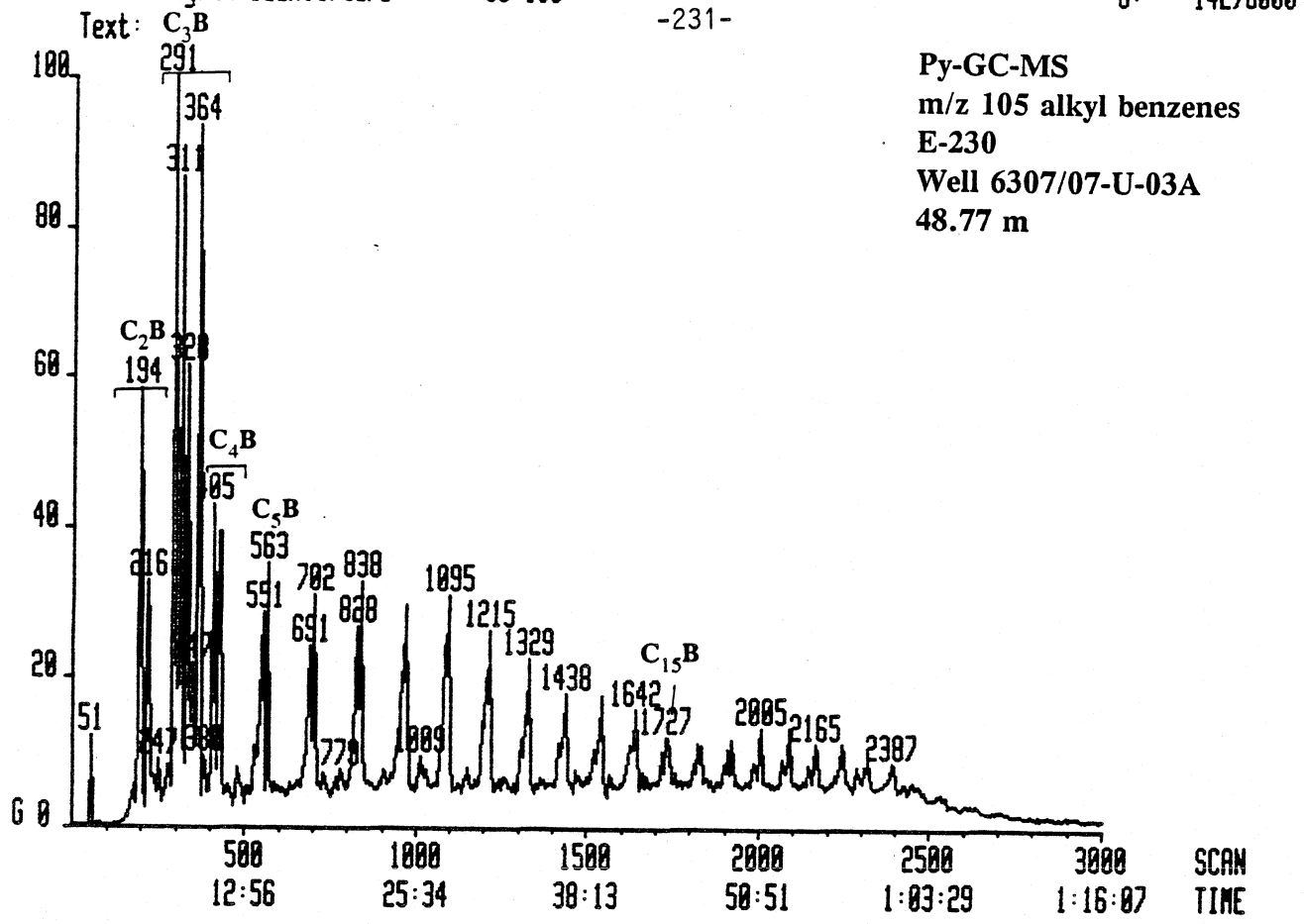
Py-GC-MS
m/z 141 naphtalenes, n-alkanes
E-193
Well 6307/07-U-03A
30.86 m



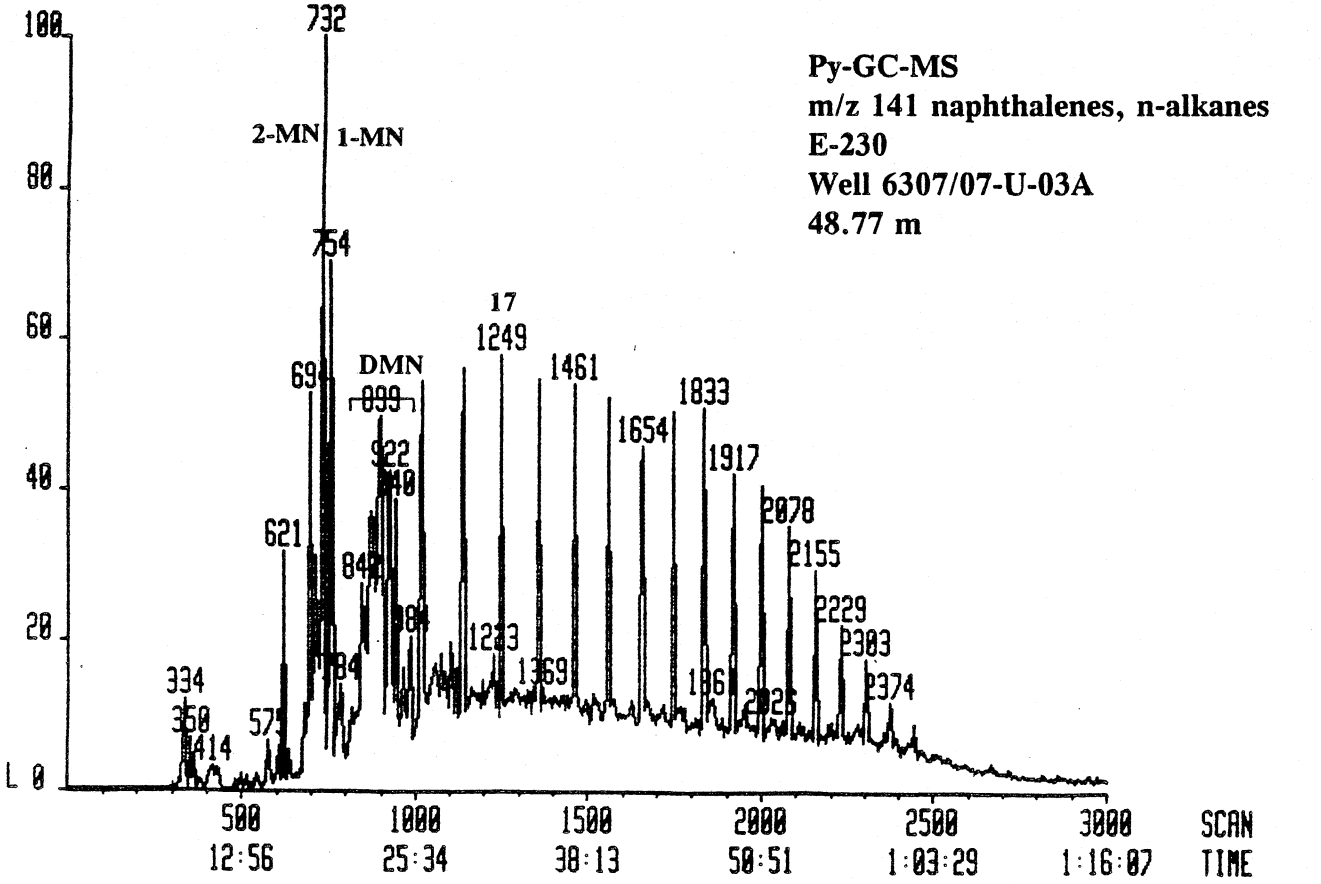
Py-GC-MS
m/z 105 alkyl benzenes
E-227
Well 6307/07-U-03A
46.20 m



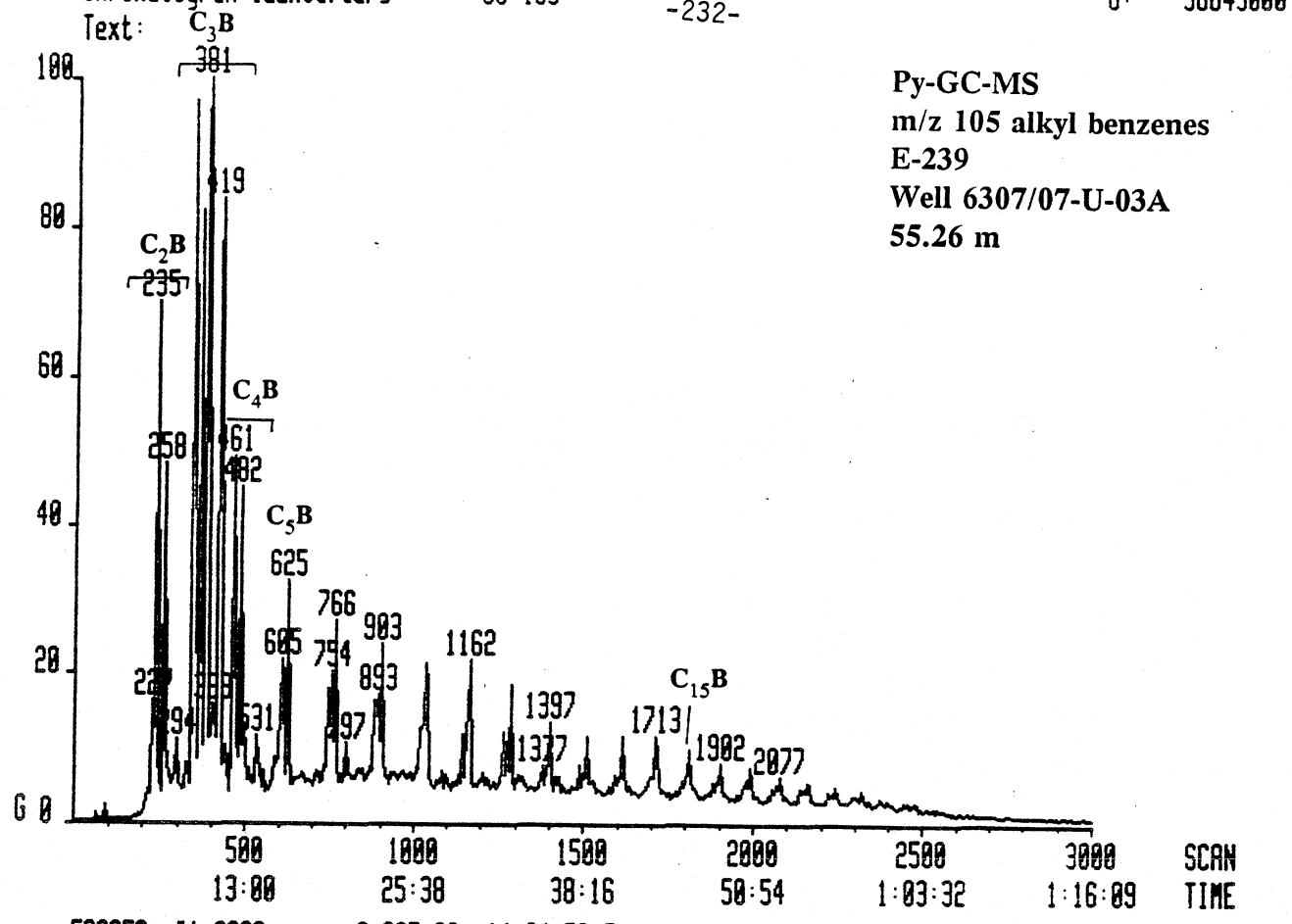
Py-GC-MS
m/z 141 naphtalenes, n-alkanes
E-227
Well 6307/07-U-03A
46.20 m



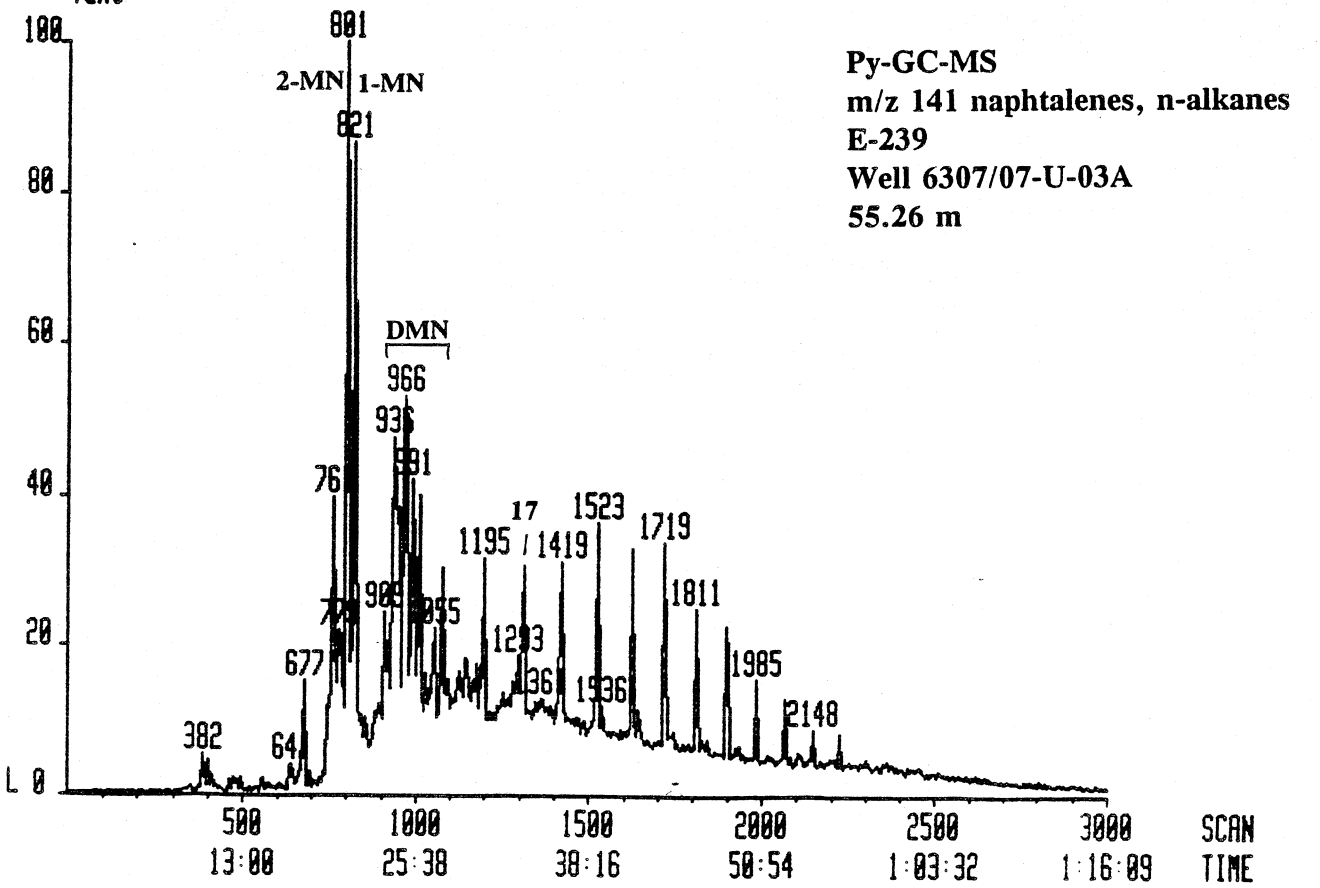
Py-GC-MS
m/z 105 alkyl benzenes
E-230
Well 6307/07-U-03A
48.77 m



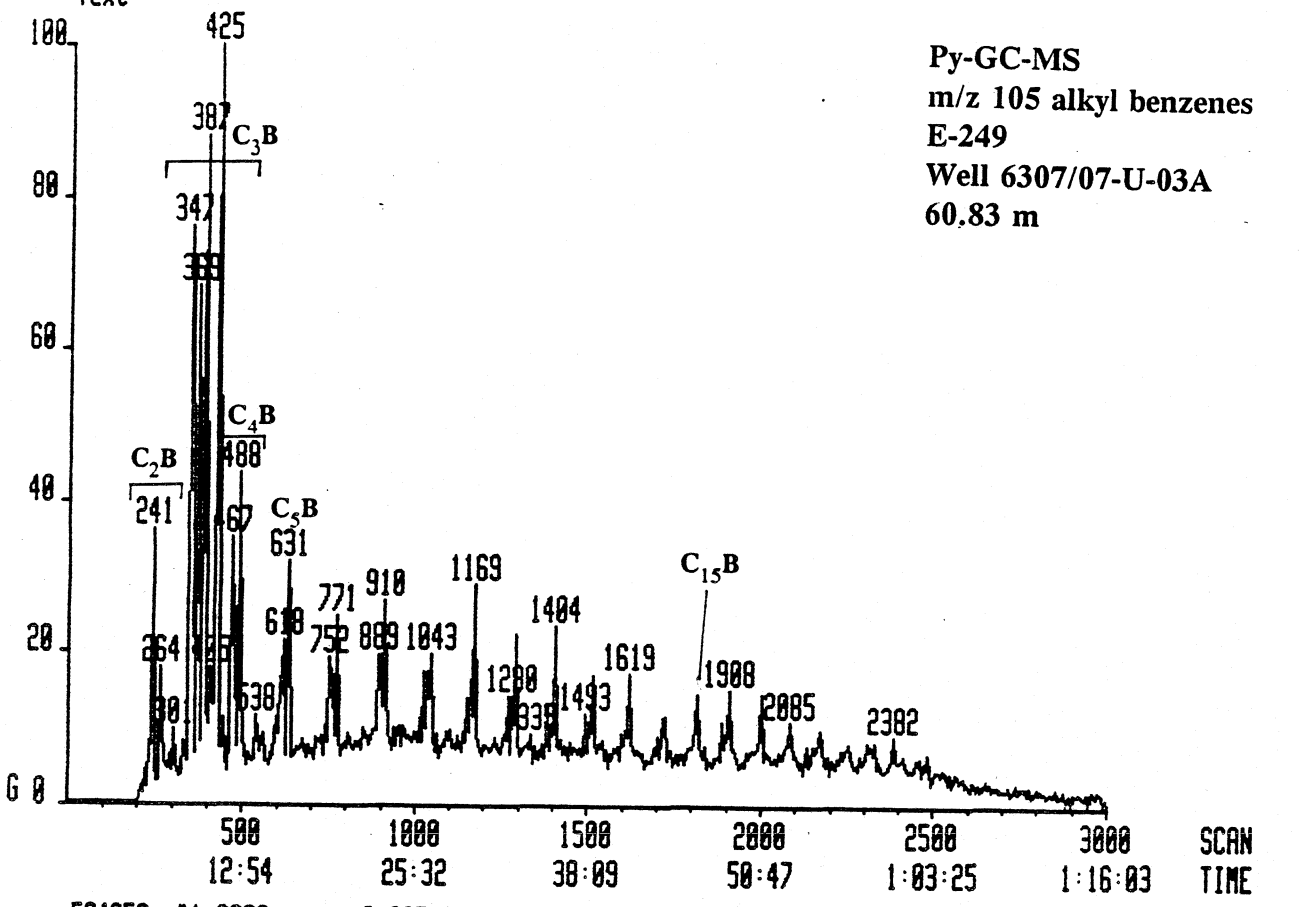
Py-GC-MS
m/z 141 naphthalenes, n-alkanes
E-230
Well 6307/07-U-03A
48.77 m



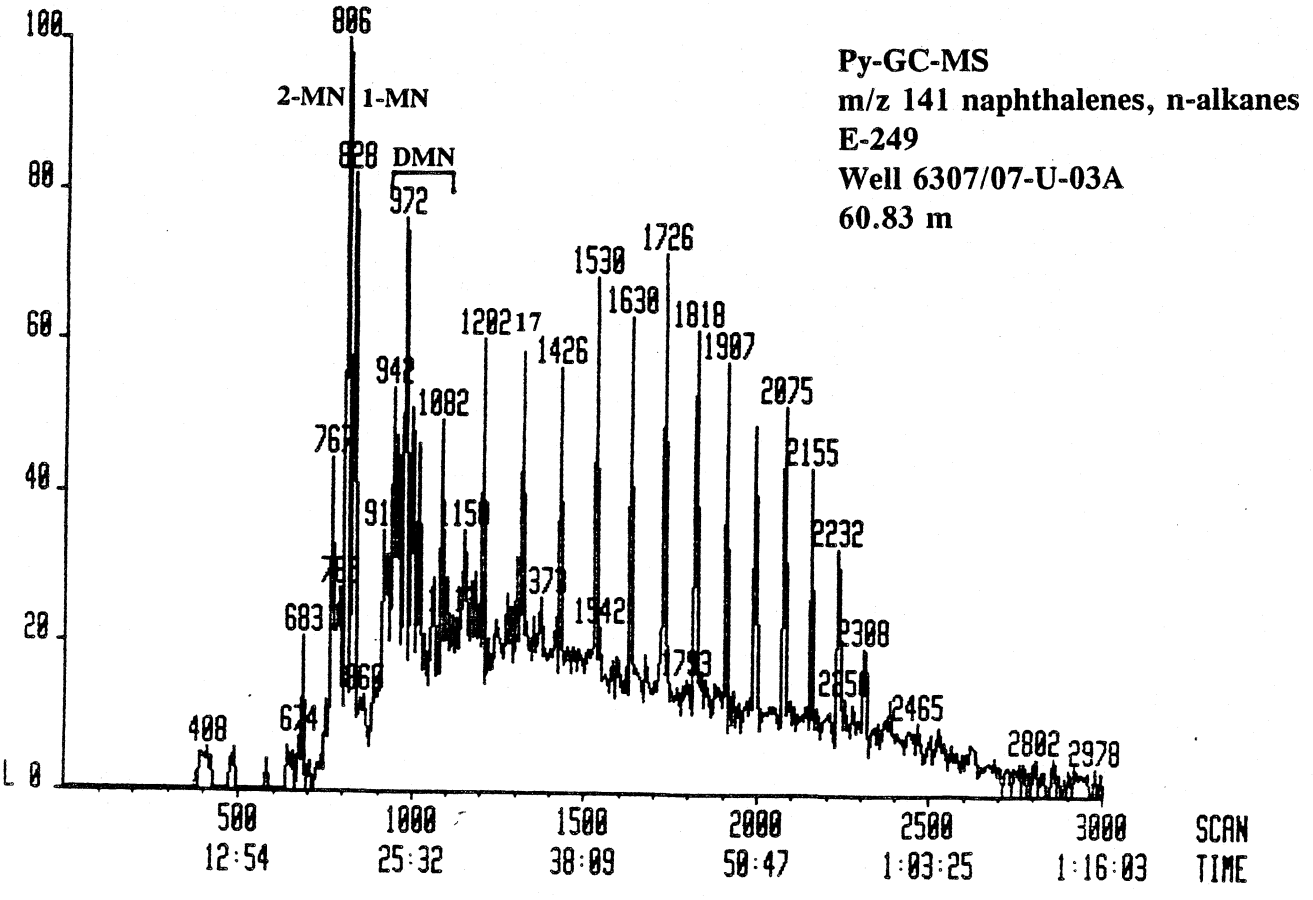
Py-GC-MS
m/z 105 alkyl benzenes
E-239
Well 6307/07-U-03A
55.26 m



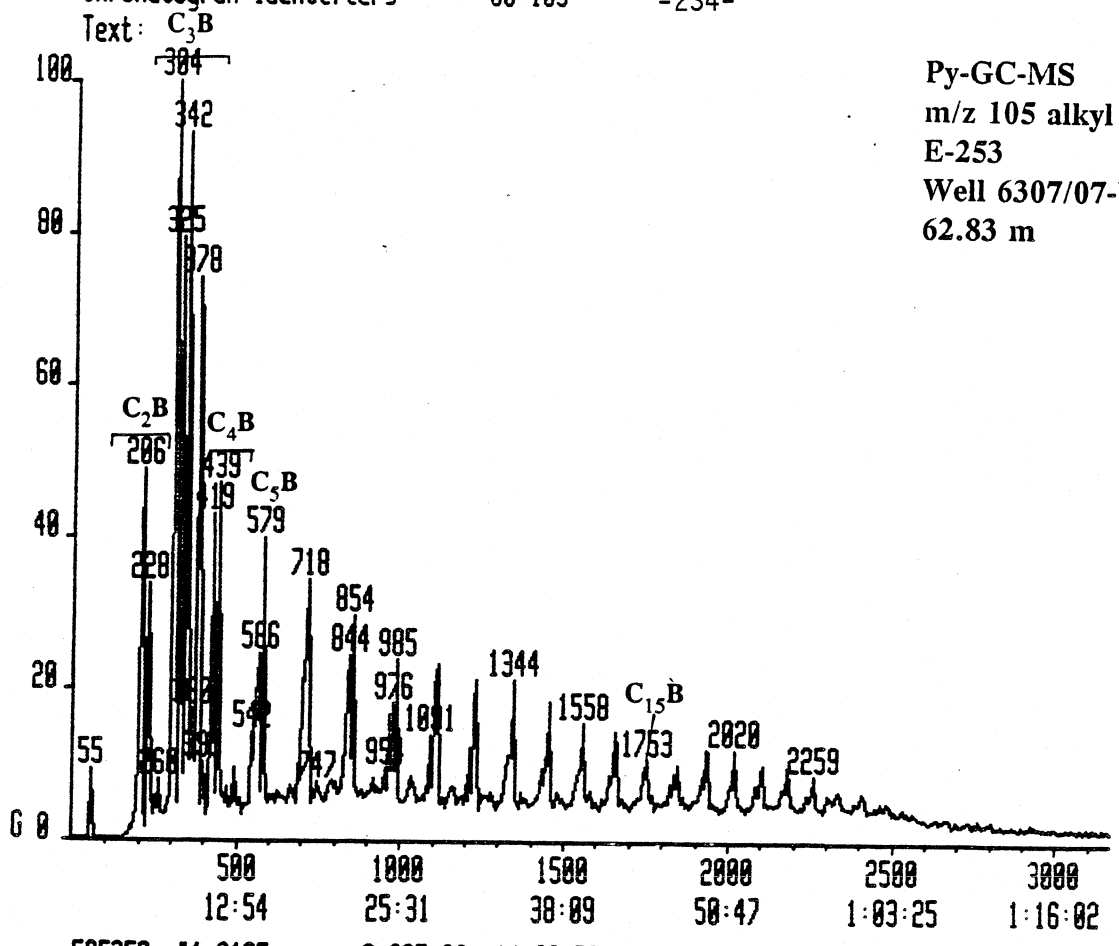
Py-GC-MS
m/z 141 naphtalenes, n-alkanes
E-239
Well 6307/07-U-03A
55.26 m



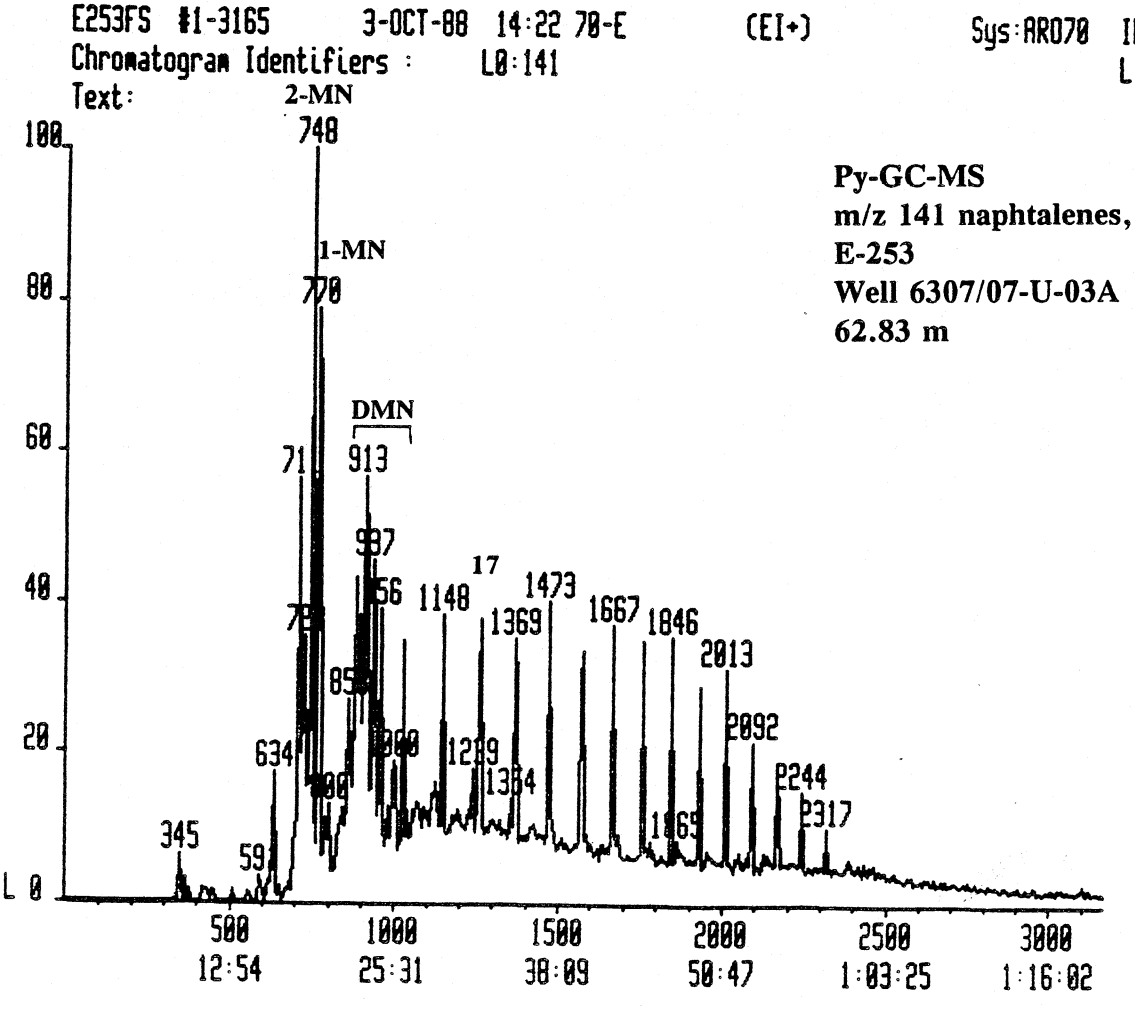
Py-GC-MS
m/z 105 alkyl benzenes
E-249
Well 6307/07-U-03A
60.83 m



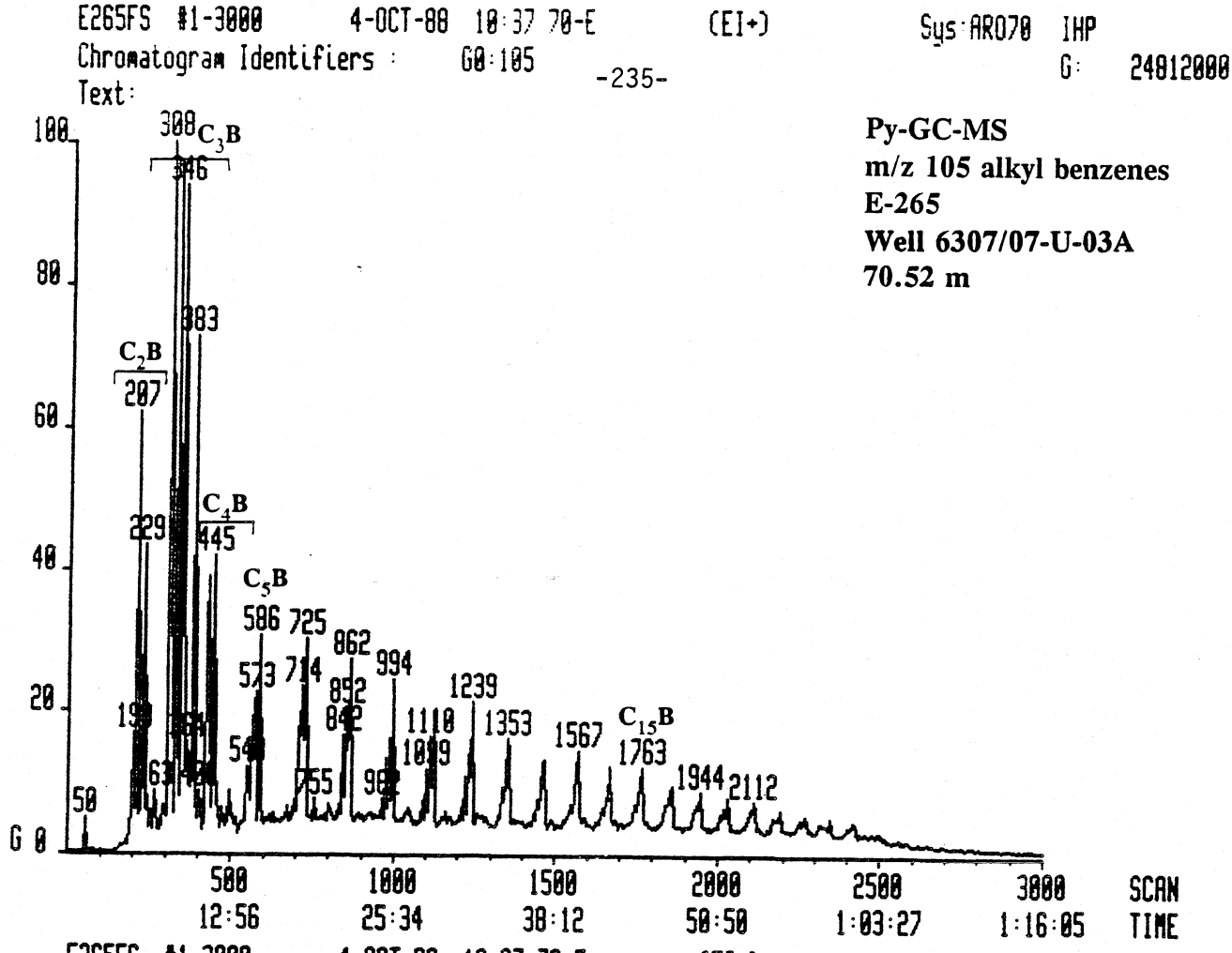
Py-GC-MS
m/z 141 naphthalenes, n-alkanes
E-249
Well 6307/07-U-03A
60.83 m

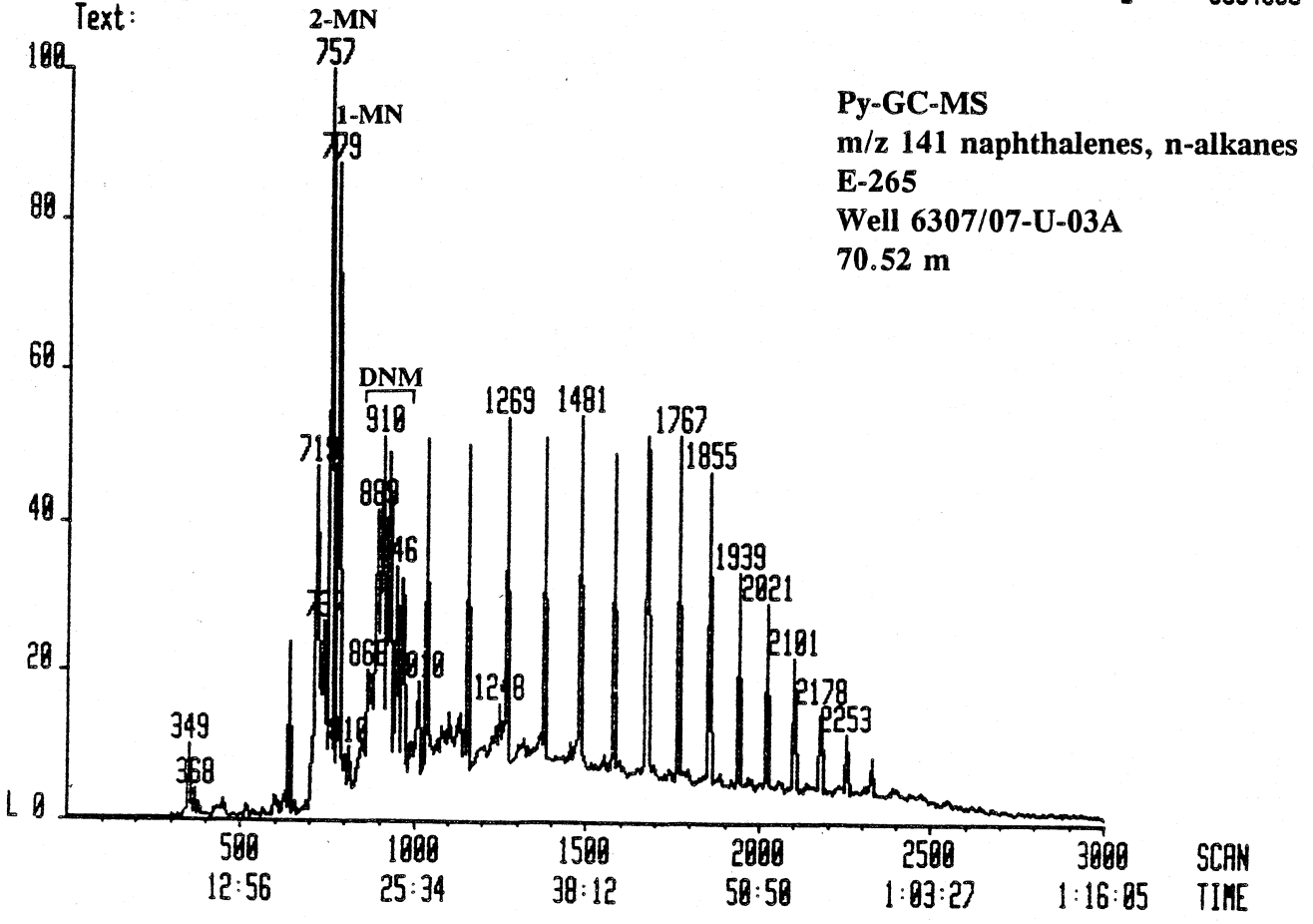


Py-GC-MS
m/z 105 alkyl benzenes
E-253
Well 6307/07-U-03A
62.83 m



Py-GC-MS
m/z 141 naphtalenes, n-alkanes
E-253
Well 6307/07-U-03A
62.83 m


E265FS #1-3000 4-OCT-88 10:37 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : G0:105 G: 24812000
Text:
Py-GC-MS
m/z 105 alkyl benzenes
E-265
Well 6307/07-U-03A
70.52 m
C3B
C2B
C4B
C5B
C15B
SCAN
TIME


E265FS #1-3000 4-OCT-88 10:37 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : L0:141 L: 9664000
Text:
Py-GC-MS
m/z 141 naphthalenes, n-alkanes
E-265
Well 6307/07-U-03A
70.52 m
2-MN
1-MN
DNM
SCAN
TIME

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Figure III.5.6e

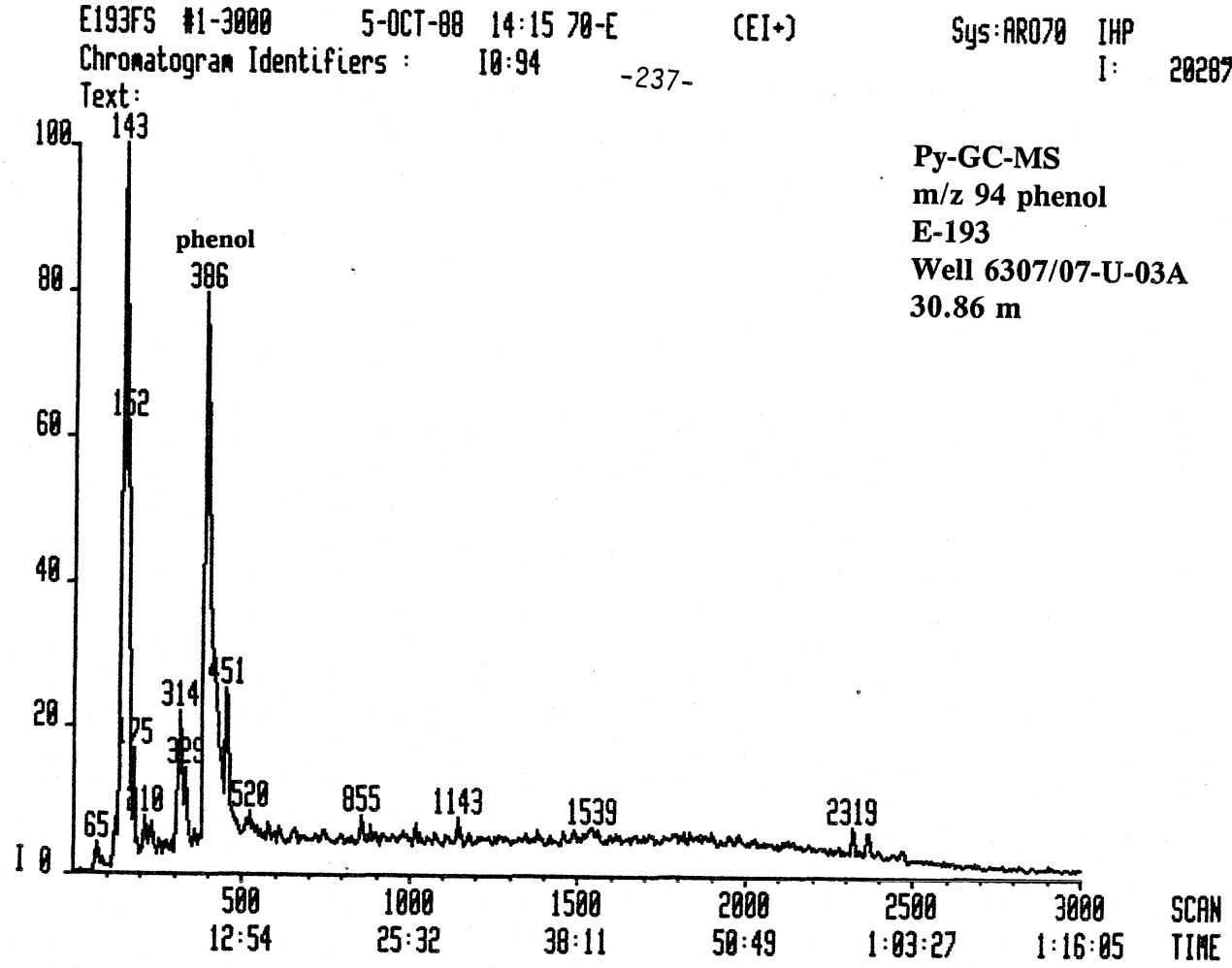
PY-GC-MS

of

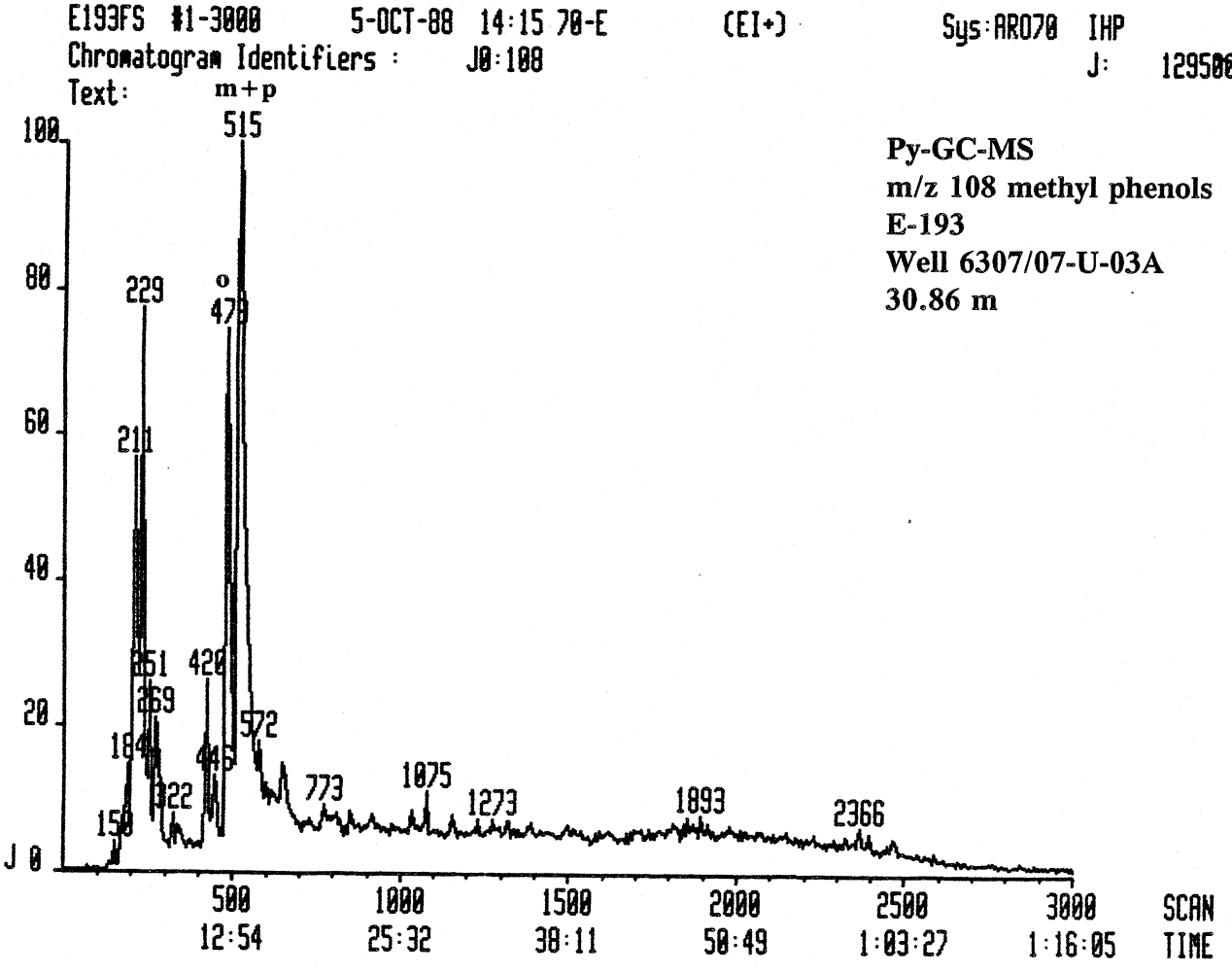
kerogens

m/z 94, 108

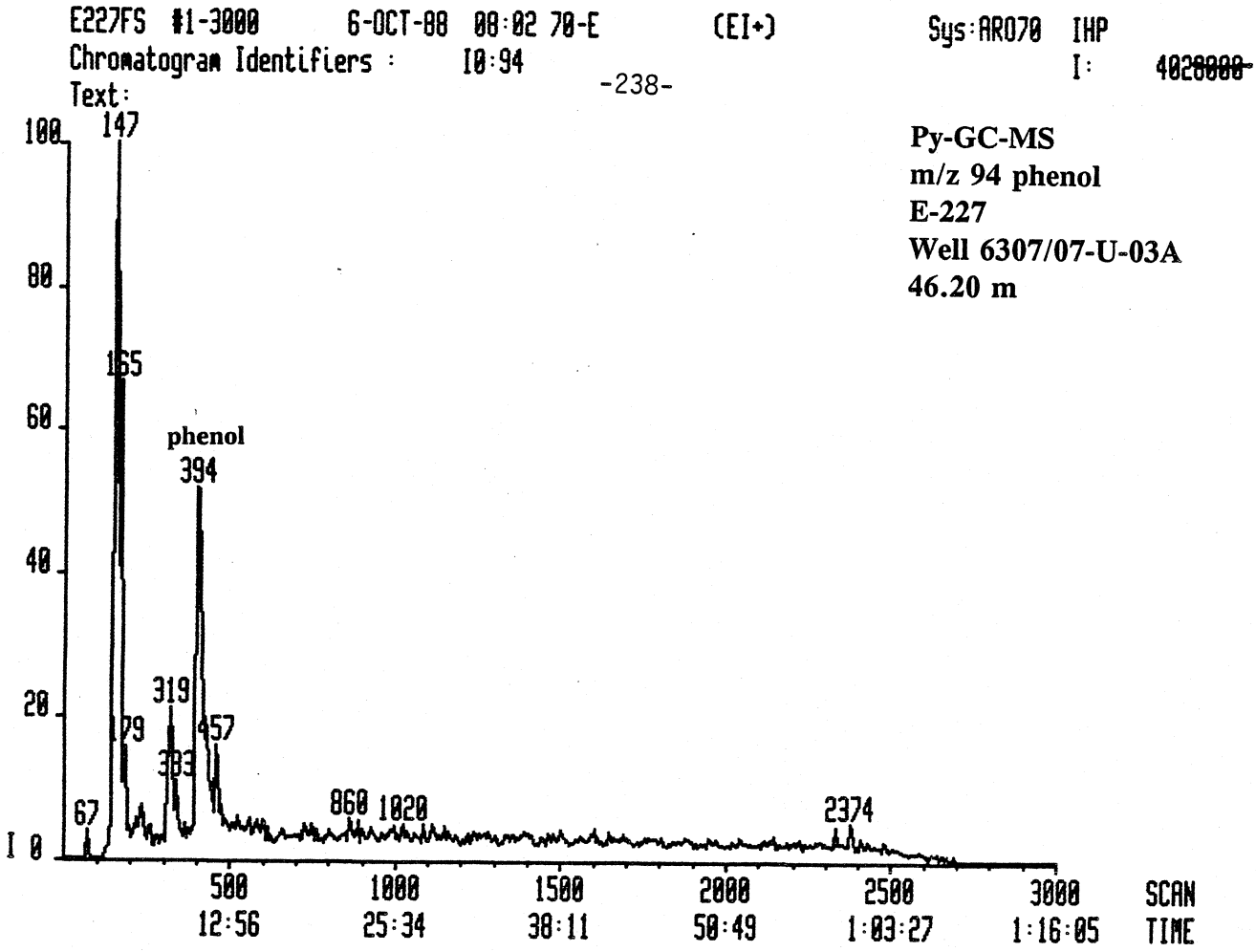
(Further identification of peaks, see section II)



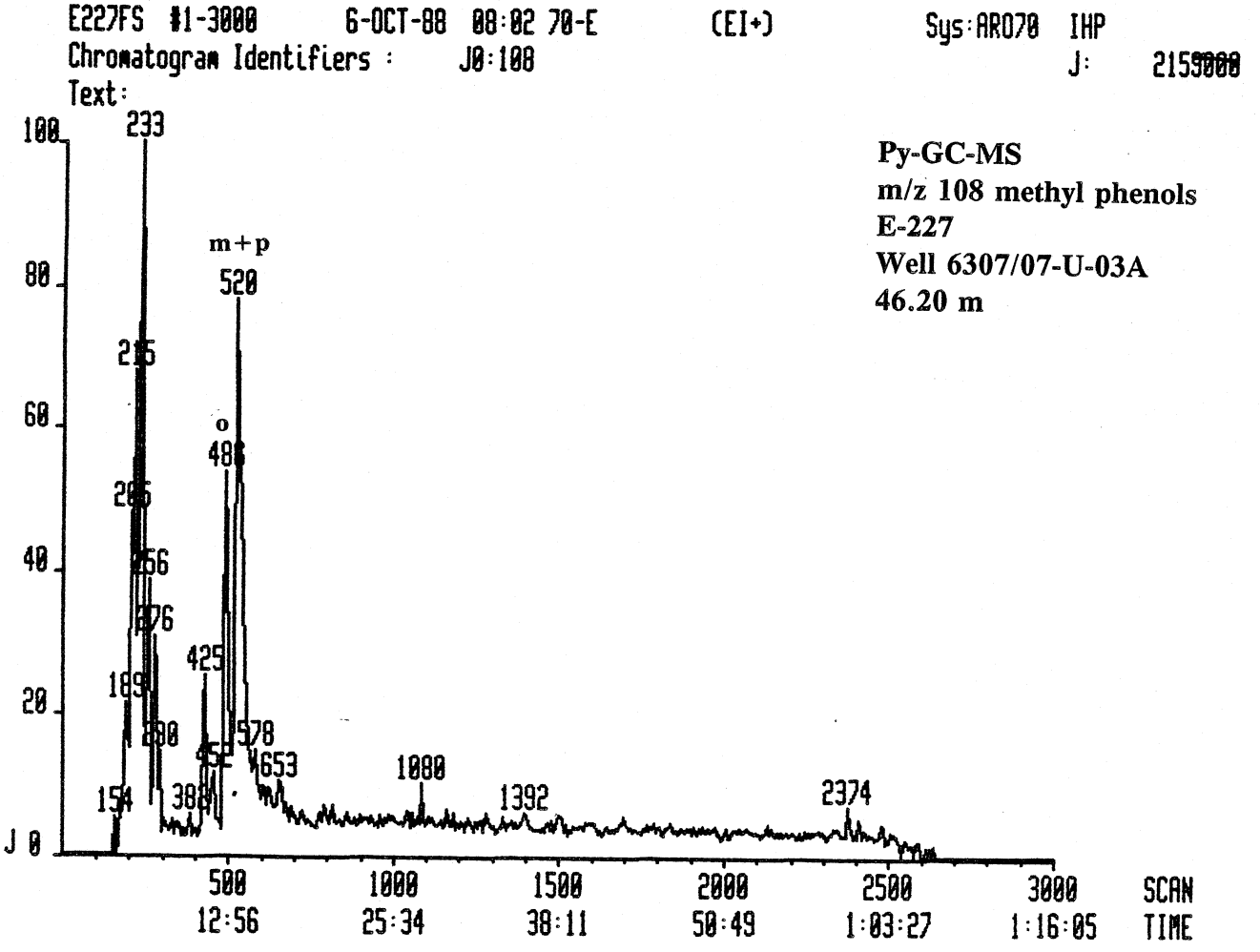
Py-GC-MS
m/z 94 phenol
E-193
Well 6307/07-U-03A
30.86 m



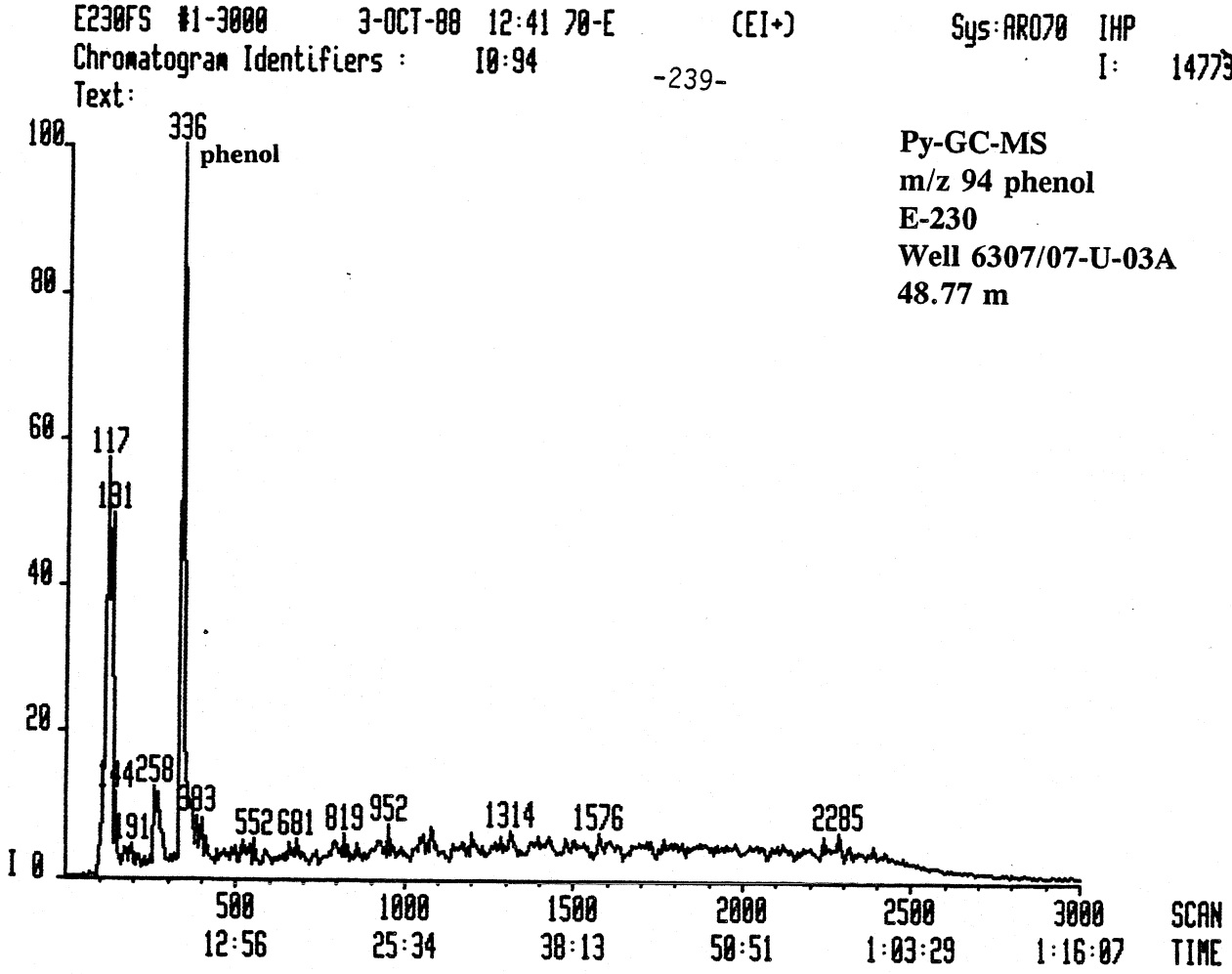
Py-GC-MS
m/z 108 methyl phenols
E-193
Well 6307/07-U-03A
30.86 m



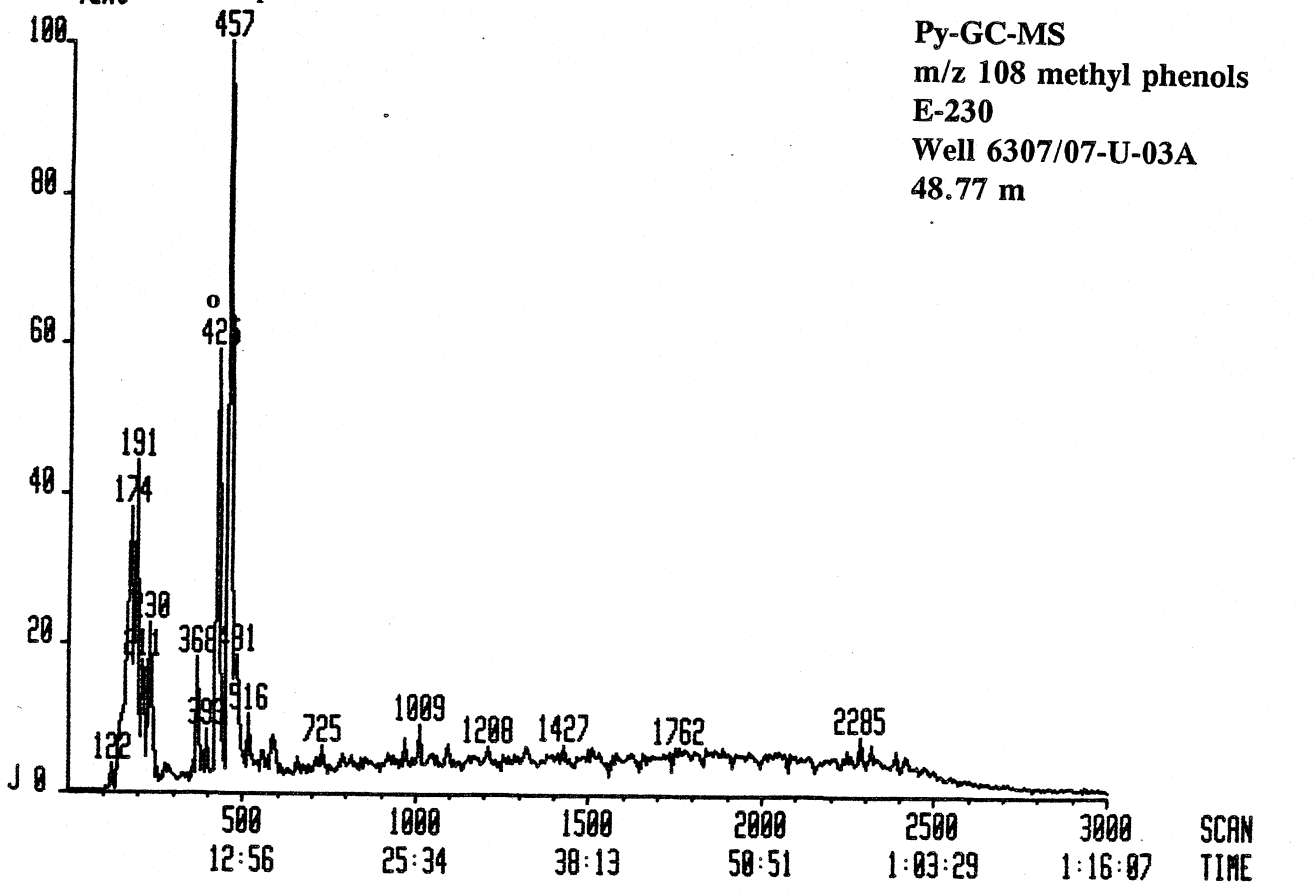
Py-GC-MS
m/z 94 phenol
E-227
Well 6307/07-U-03A
46.20 m



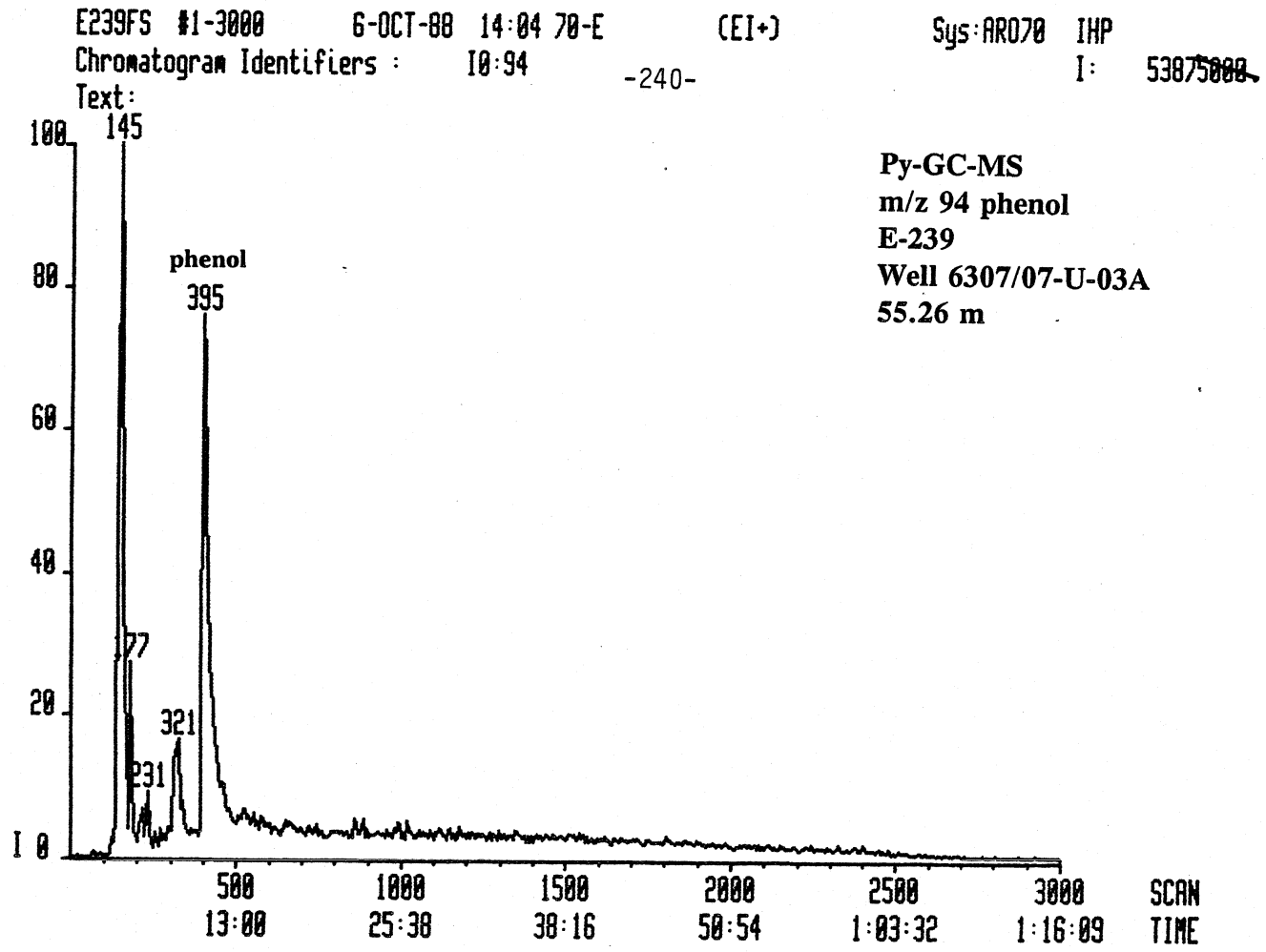
Py-GC-MS
m/z 108 methyl phenols
E-227
Well 6307/07-U-03A
46.20 m



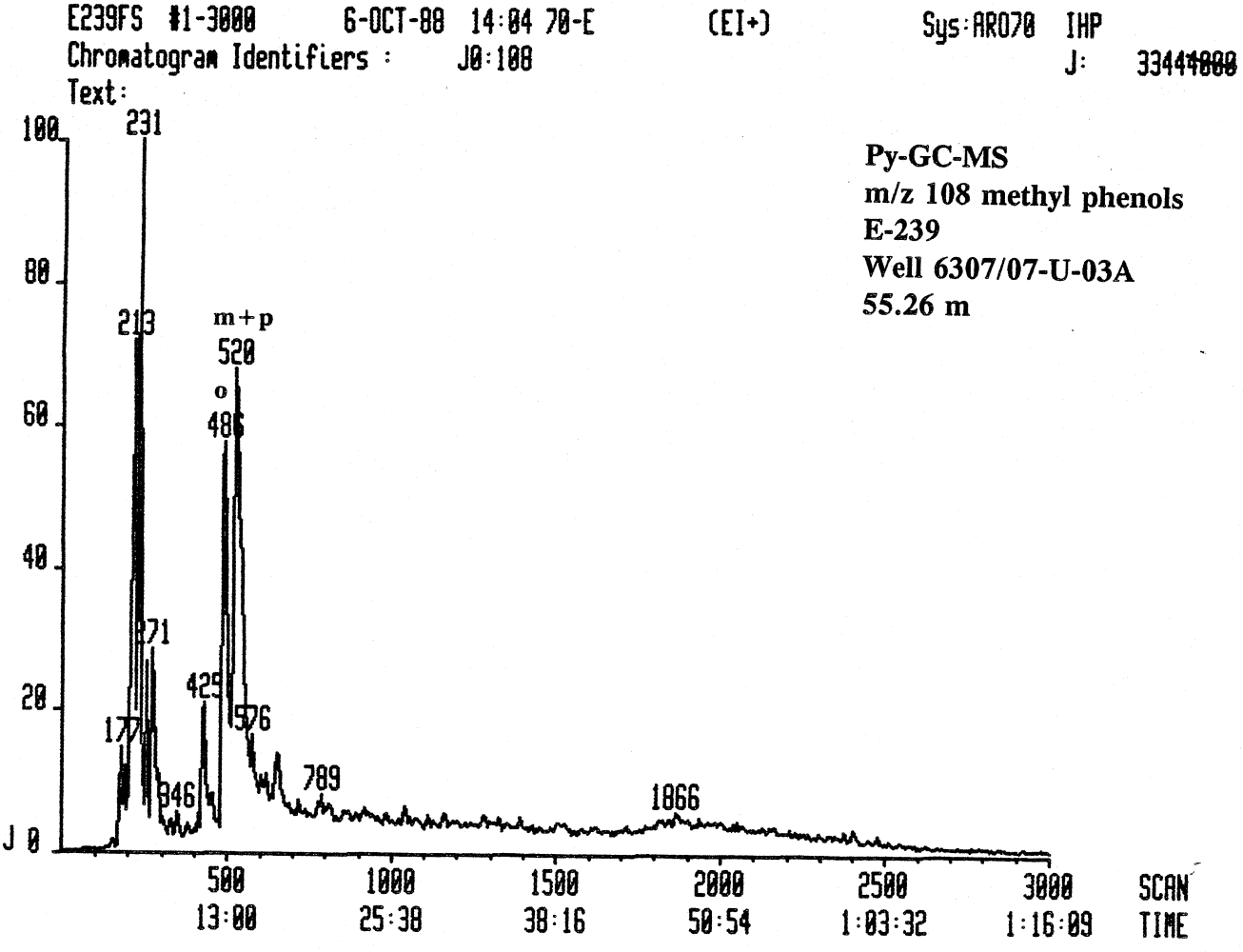
Py-GC-MS
m/z 94 phenol
E-230
Well 6307/07-U-03A
48.77 m



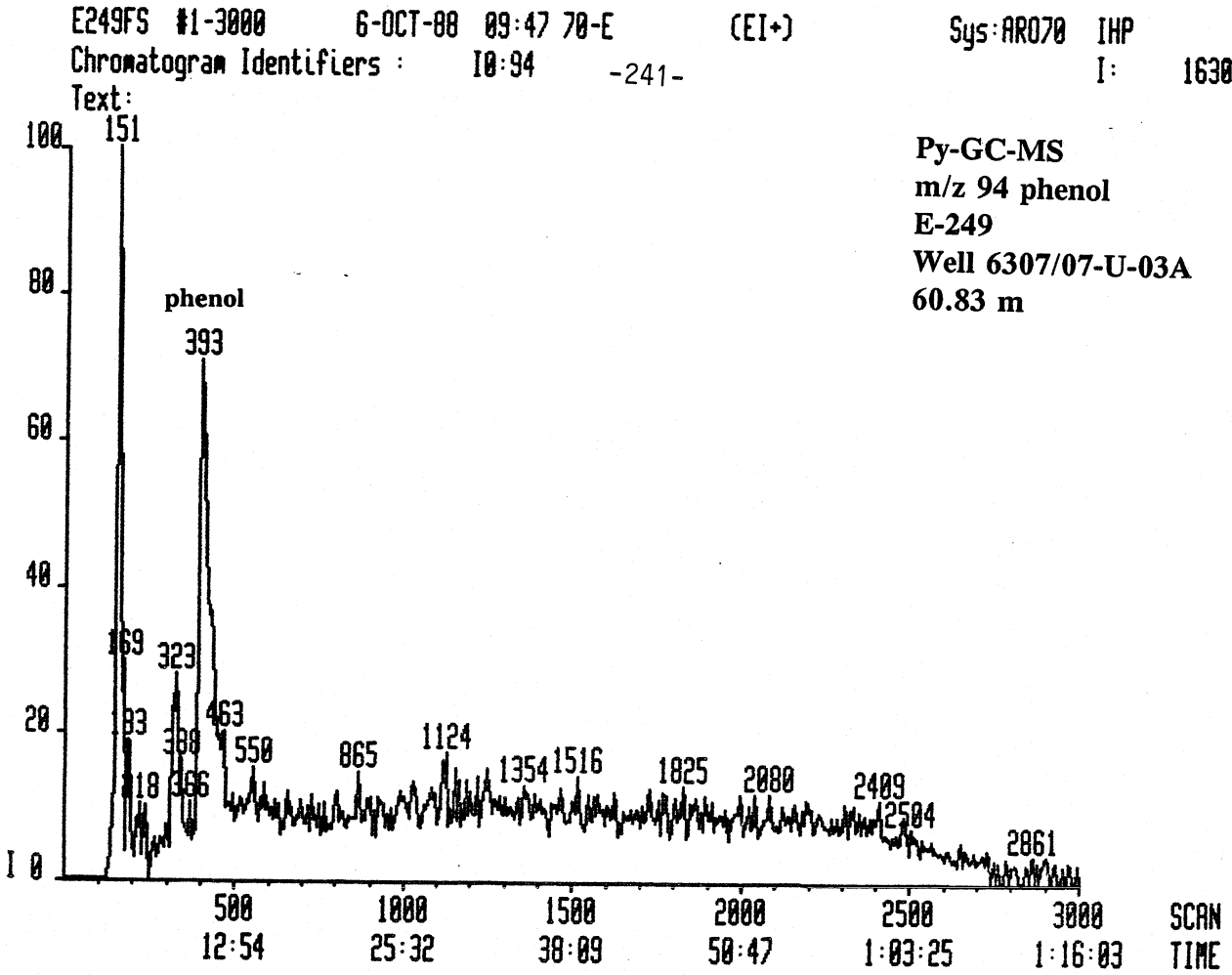
Py-GC-MS
m/z 108 methyl phenols
E-230
Well 6307/07-U-03A
48.77 m



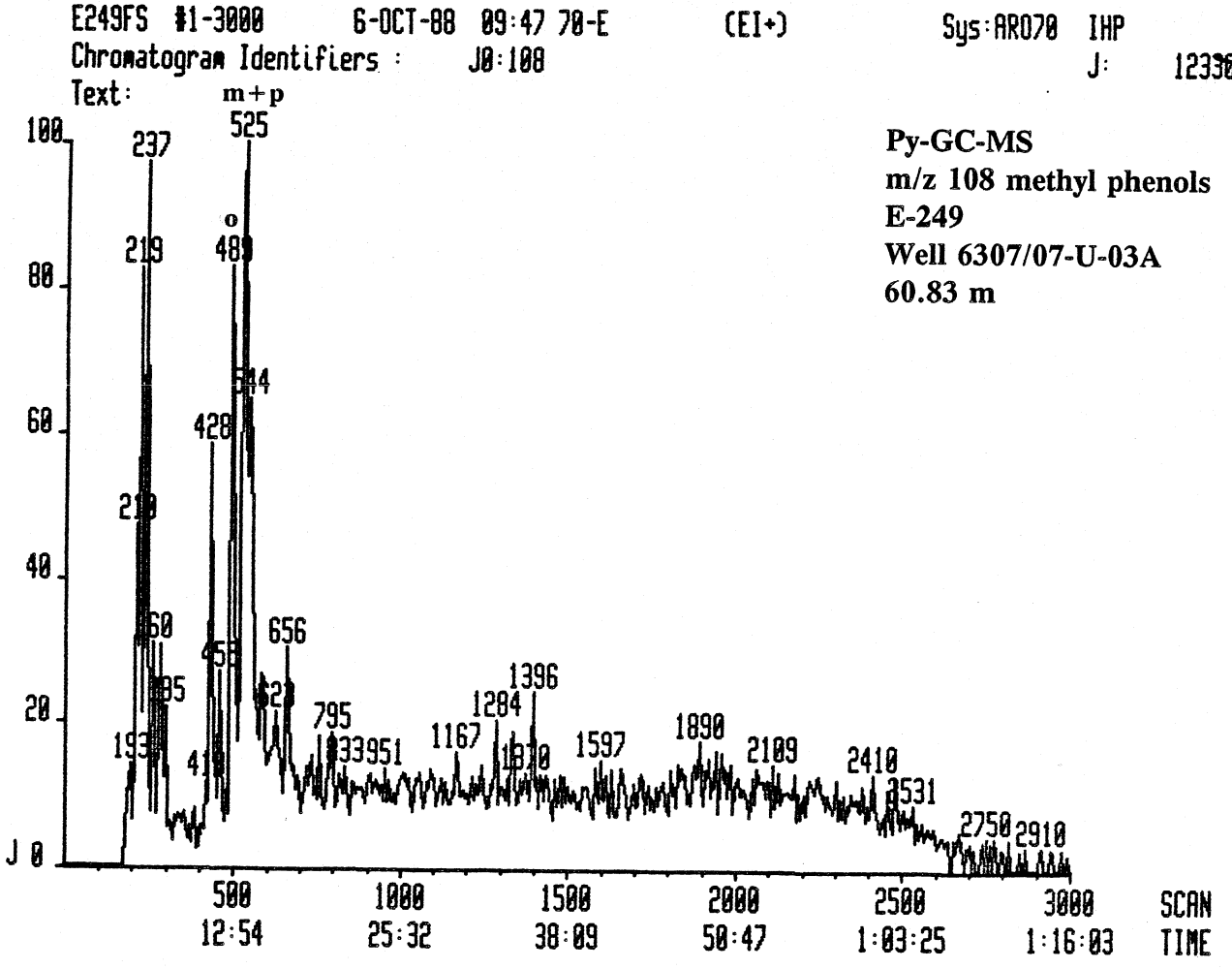
Py-GC-MS
m/z 94 phenol
E-239
Well 6307/07-U-03A
55.26 m



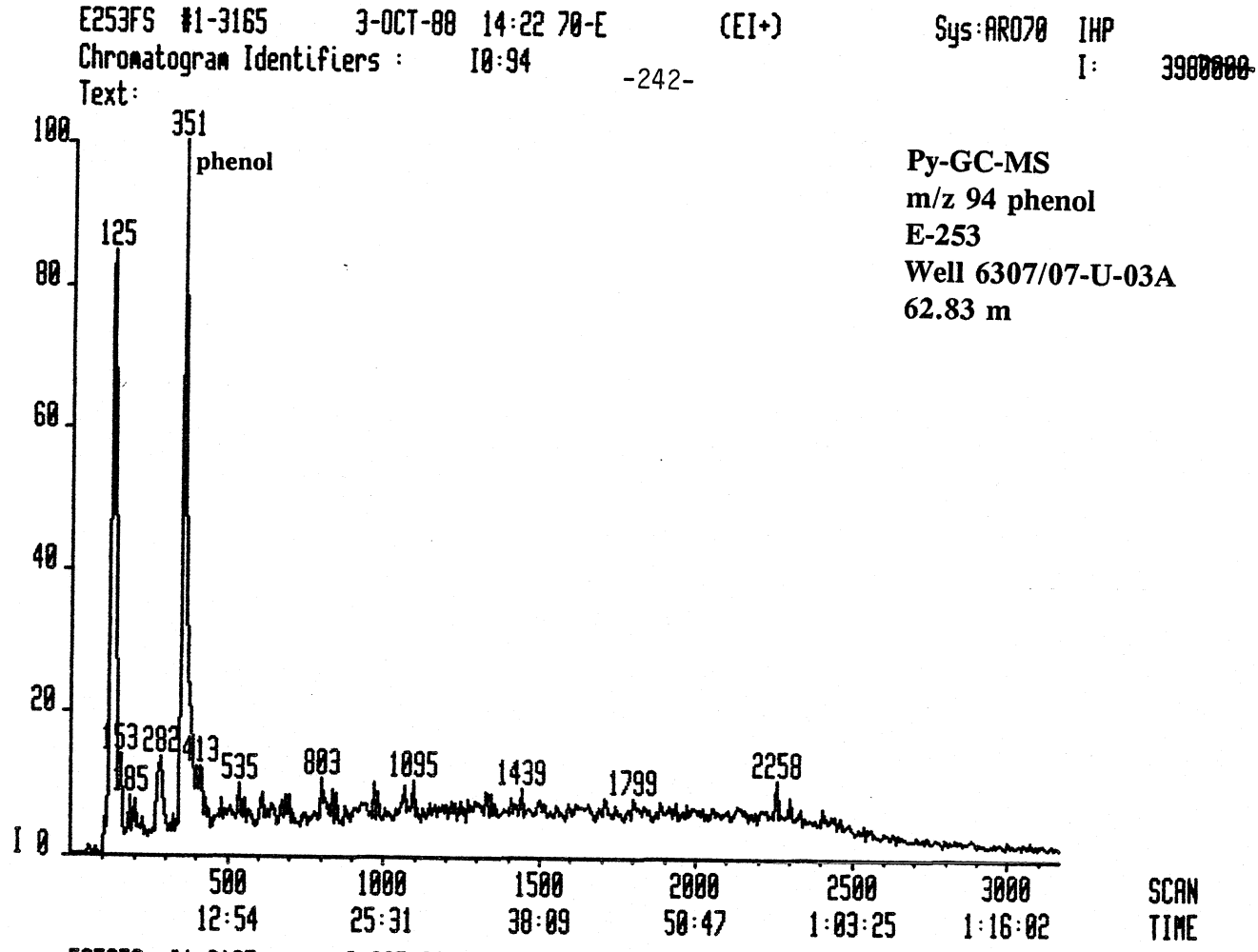
Py-GC-MS
m/z 108 methyl phenols
E-239
Well 6307/07-U-03A
55.26 m



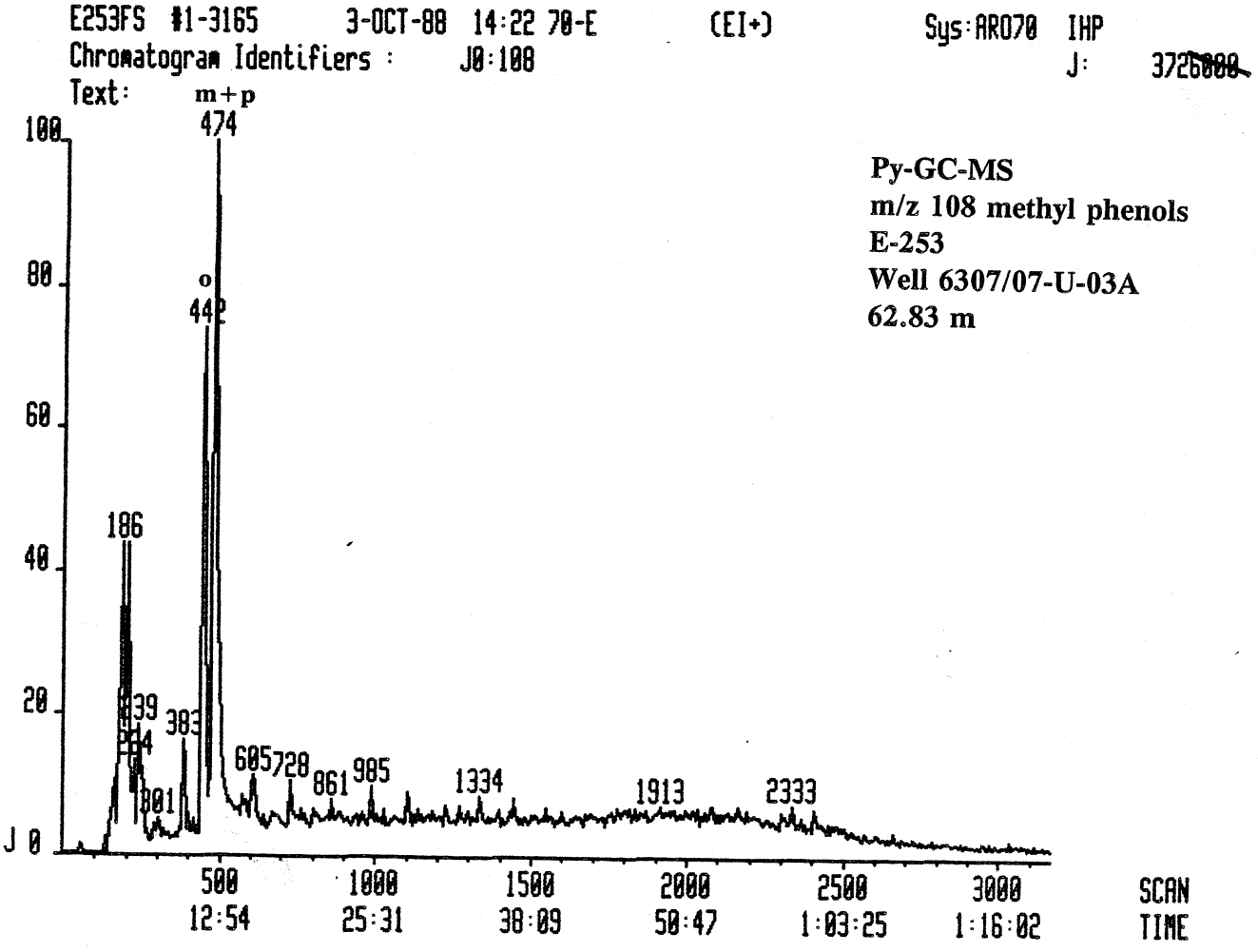
Py-GC-MS
m/z 94 phenol
E-249
Well 6307/07-U-03A
60.83 m



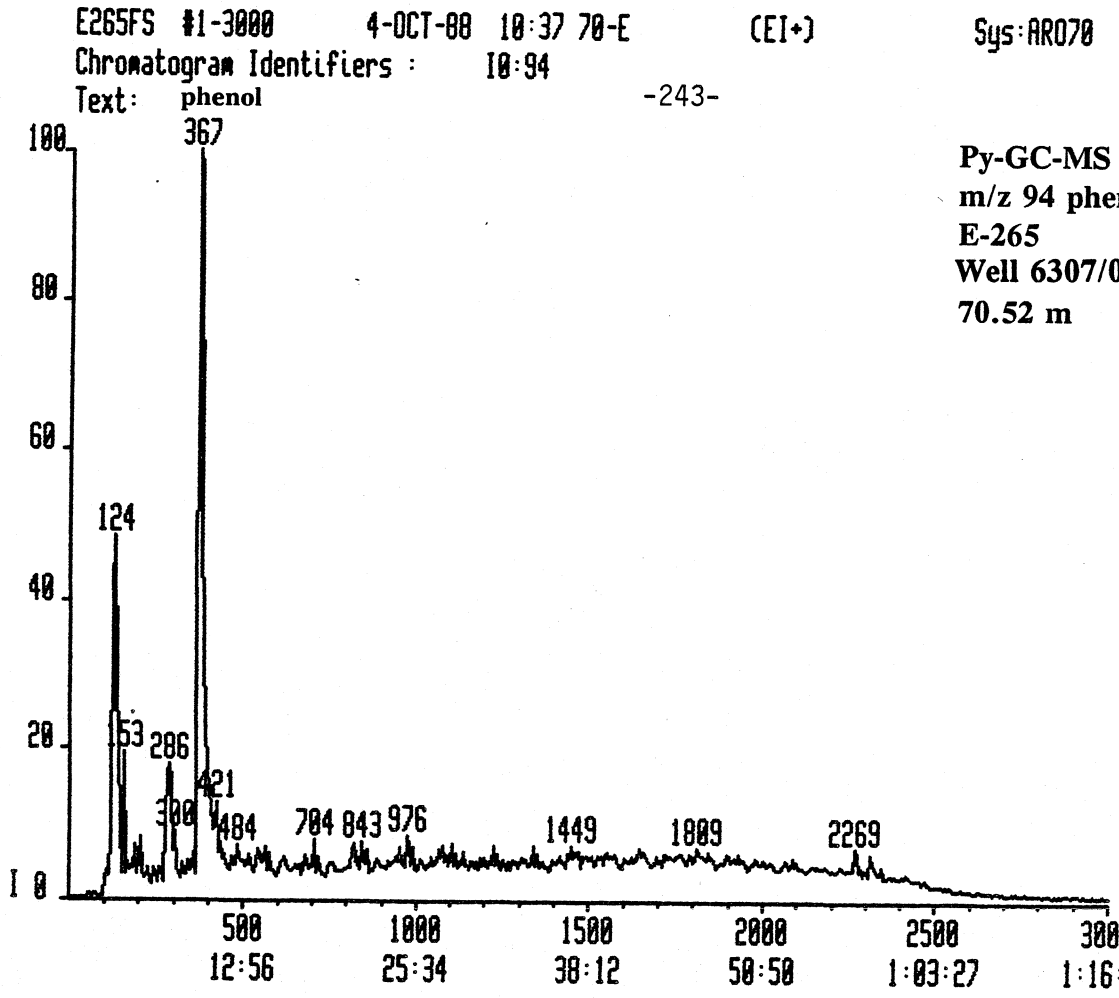
Py-GC-MS
m/z 108 methyl phenols
E-249
Well 6307/07-U-03A
60.83 m



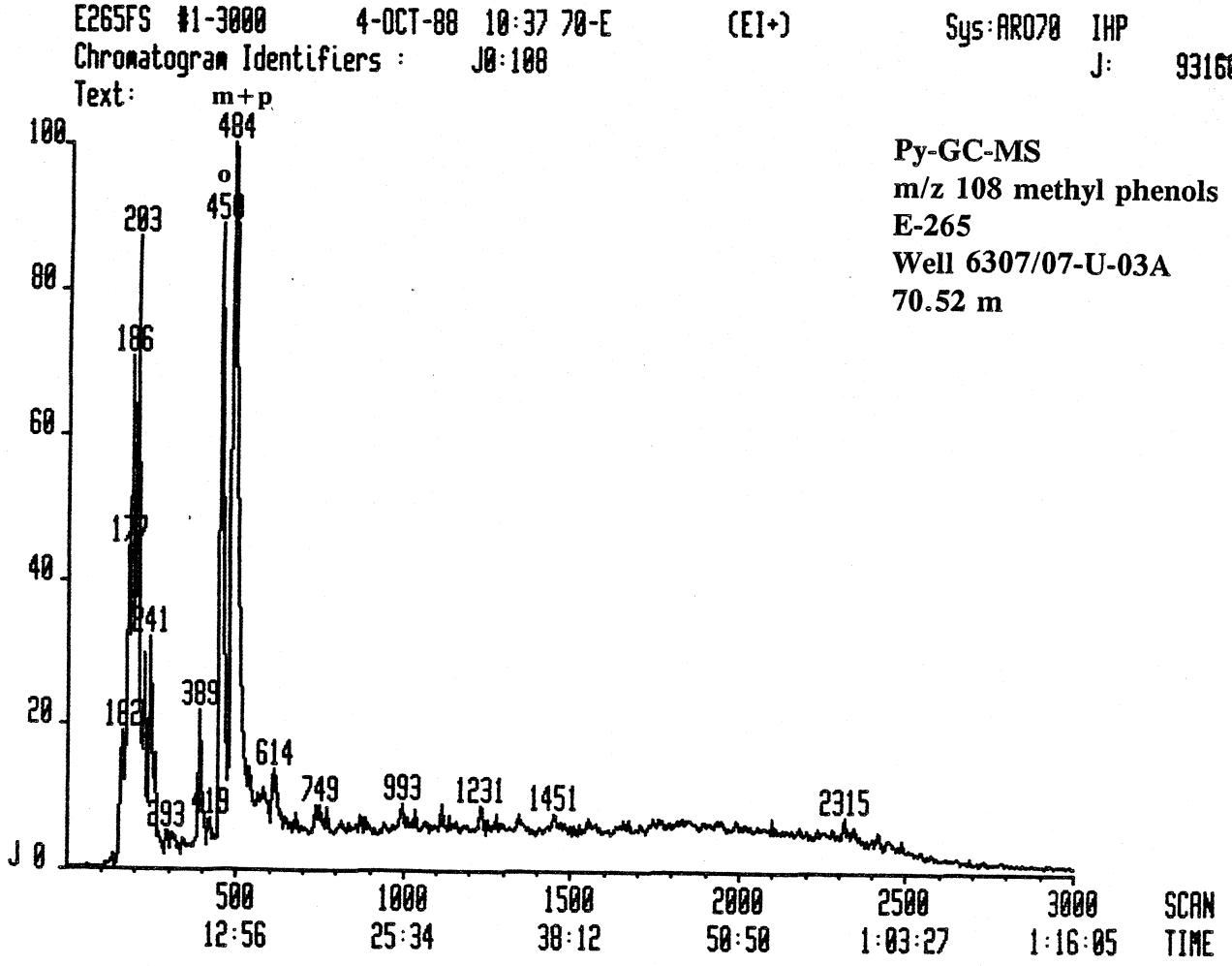
Py-GC-MS
m/z 94 phenol
E-253
Well 6307/07-U-03A
62.83 m



Py-GC-MS
m/z 108 methyl phenols
E-253
Well 6307/07-U-03A
62.83 m



Py-GC-MS
m/z 94 phenol
E-265
Well 6307/07-U-03A
70.52 m



Py-GC-MS
m/z 108 methyl phenols
E-265
Well 6307/07-U-03A
70.52 m

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Figure III.5.6f

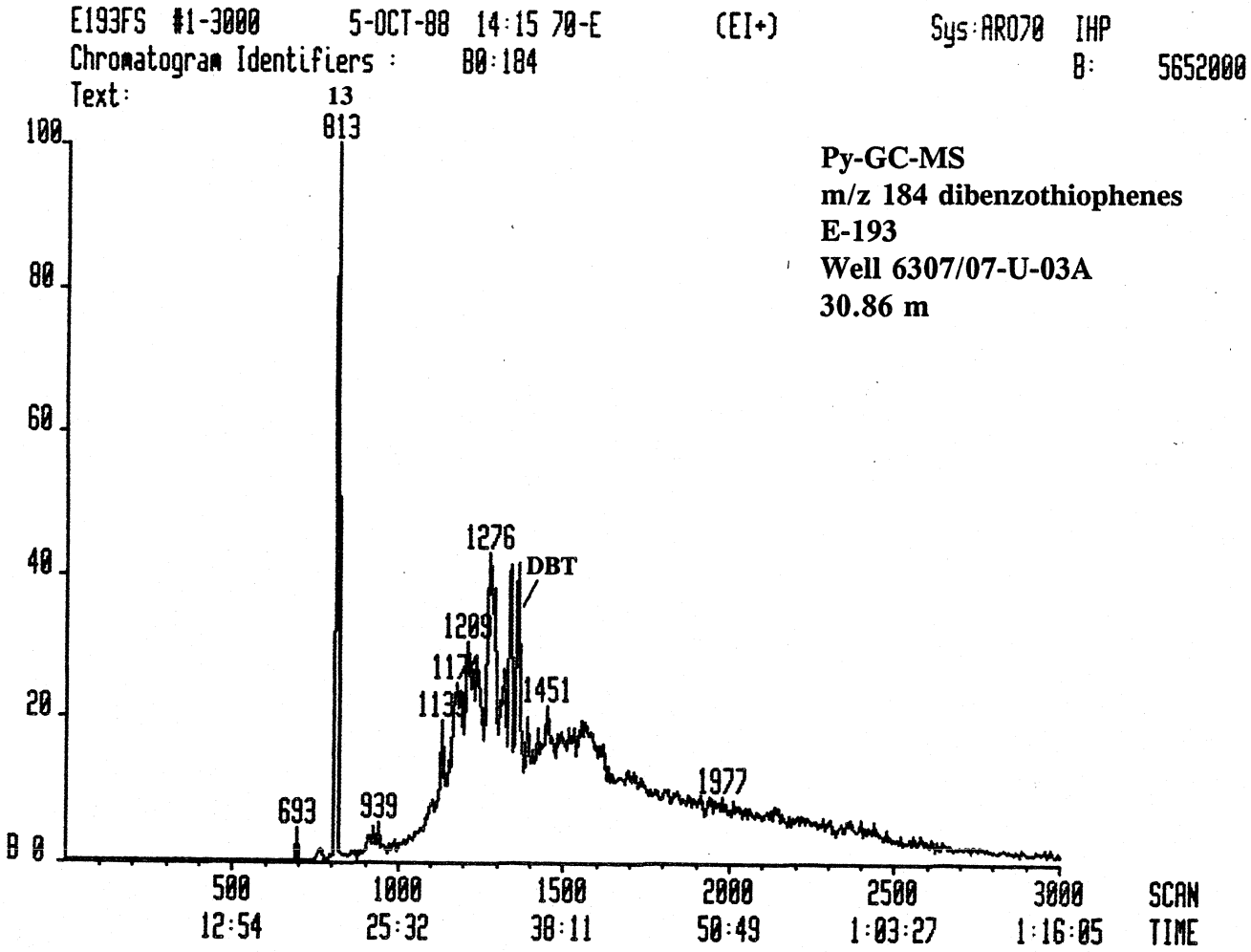
PY-GC-MS

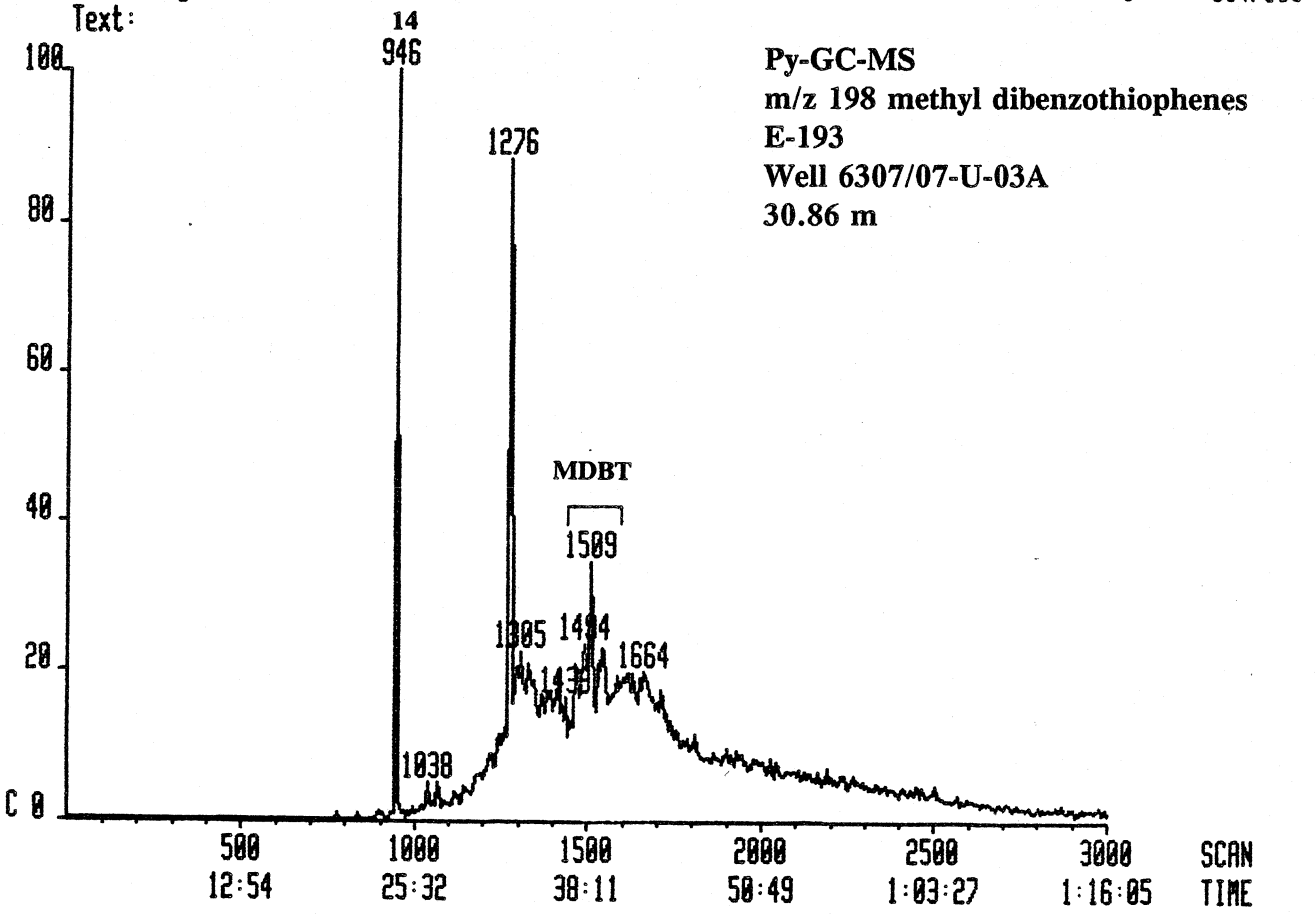
of

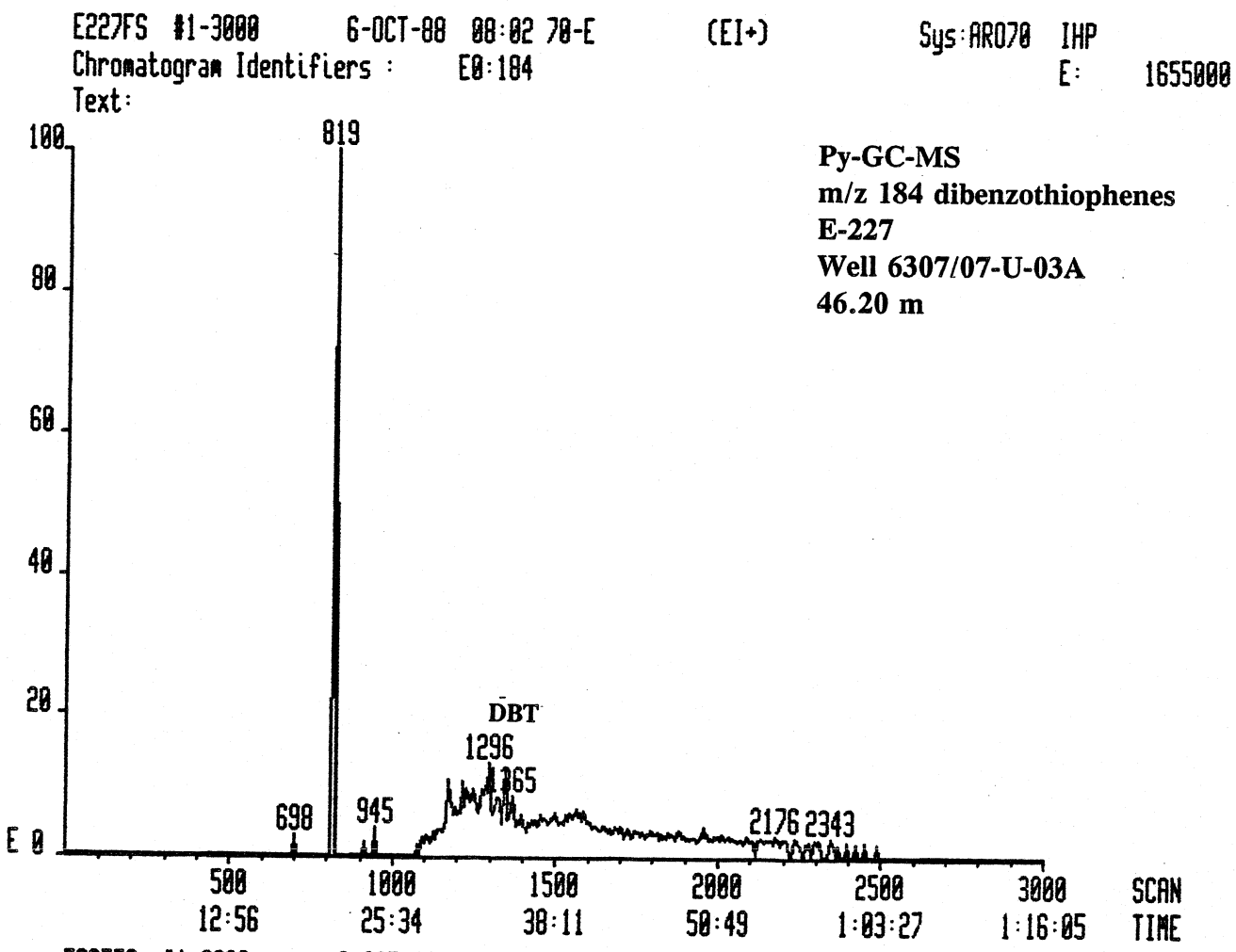
kerogens

m/z 184, 198

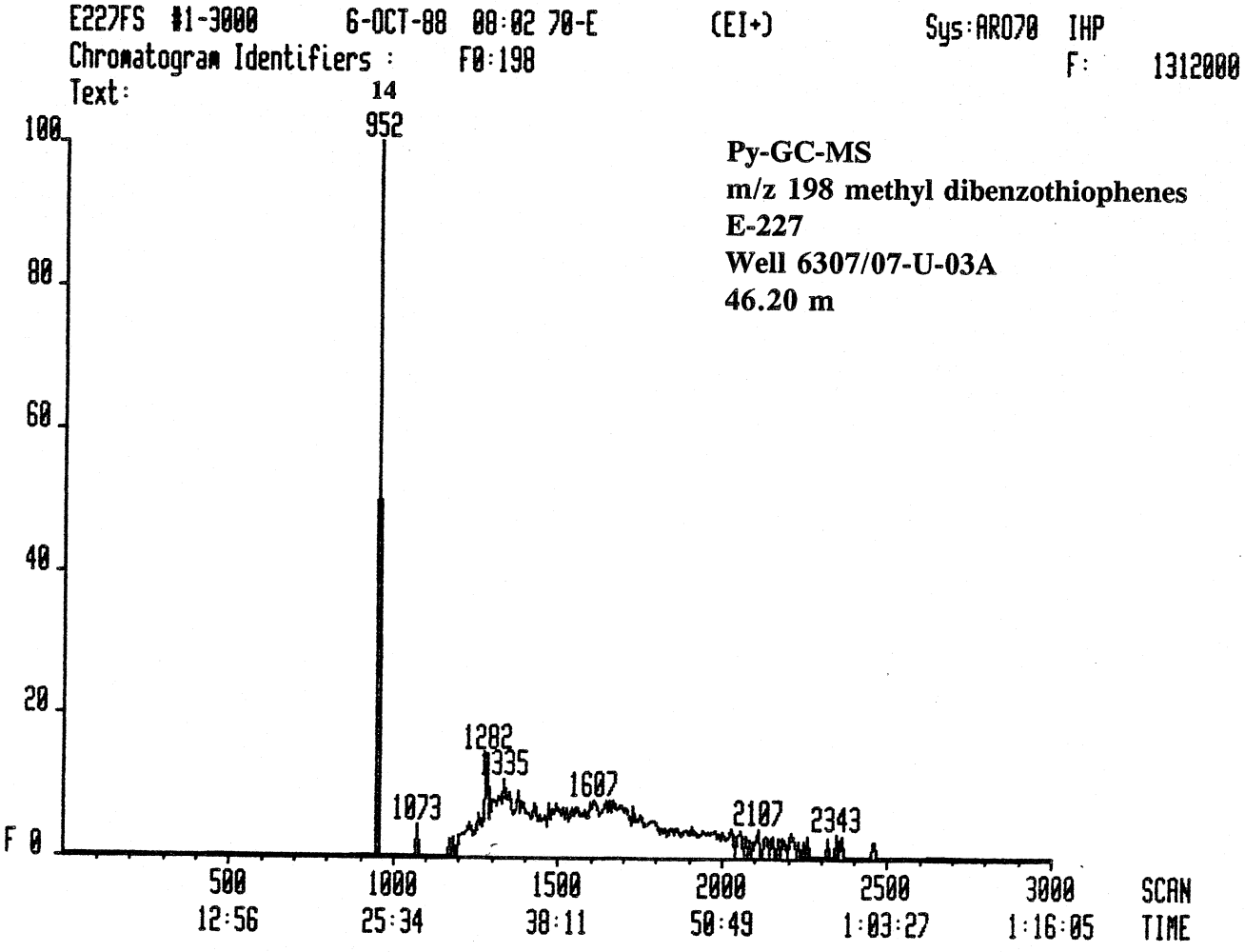
(Further identification of peaks, see section II)


E193FS #1-3000 5-OCT-88 14:15 70-E (EI+) Sys:AR070 IHP
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Text:
13
813
100
80
60
40
20
B 0
1276
DBT
1209
1174
1139
1451
1977
693
939
500 1000 1500 2000 2500 3000 SCAN
12:54 25:32 38:11 50:49 1:03:27 1:16:05 TIME
Py-GC-MS
m/z 184 dibenzothiophenes
E-193
Well 6307/07-U-03A
30.86 m

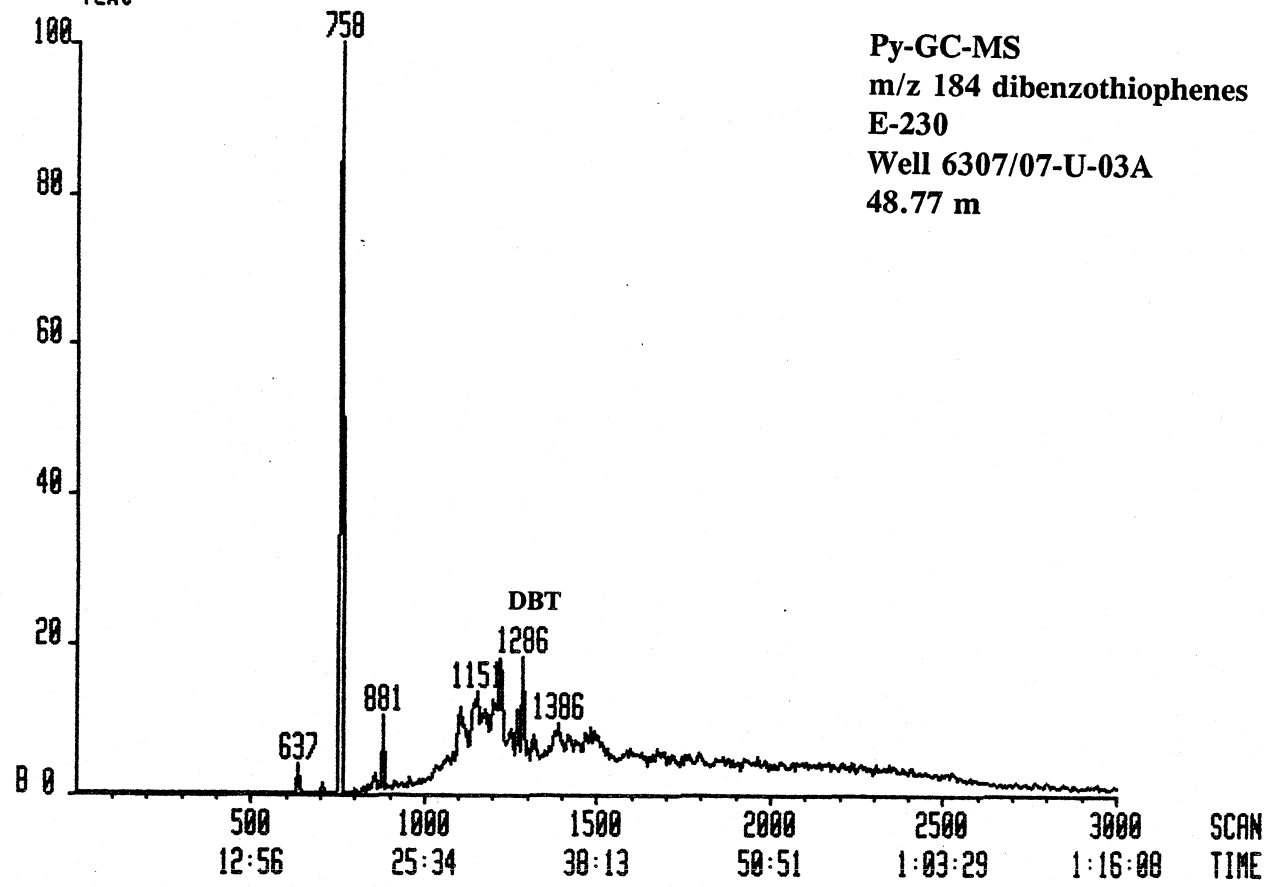

E193FS #1-3000 5-OCT-88 14:15 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:198 C: 5547000
Text:
14
946
100
80
60
40
20
C 0
1276
MDBT
1509
1305
1494
1664
1038
500 1000 1500 2000 2500 3000 SCAN
12:54 25:32 38:11 50:49 1:03:27 1:16:05 TIME
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-193
Well 6307/07-U-03A
30.86 m



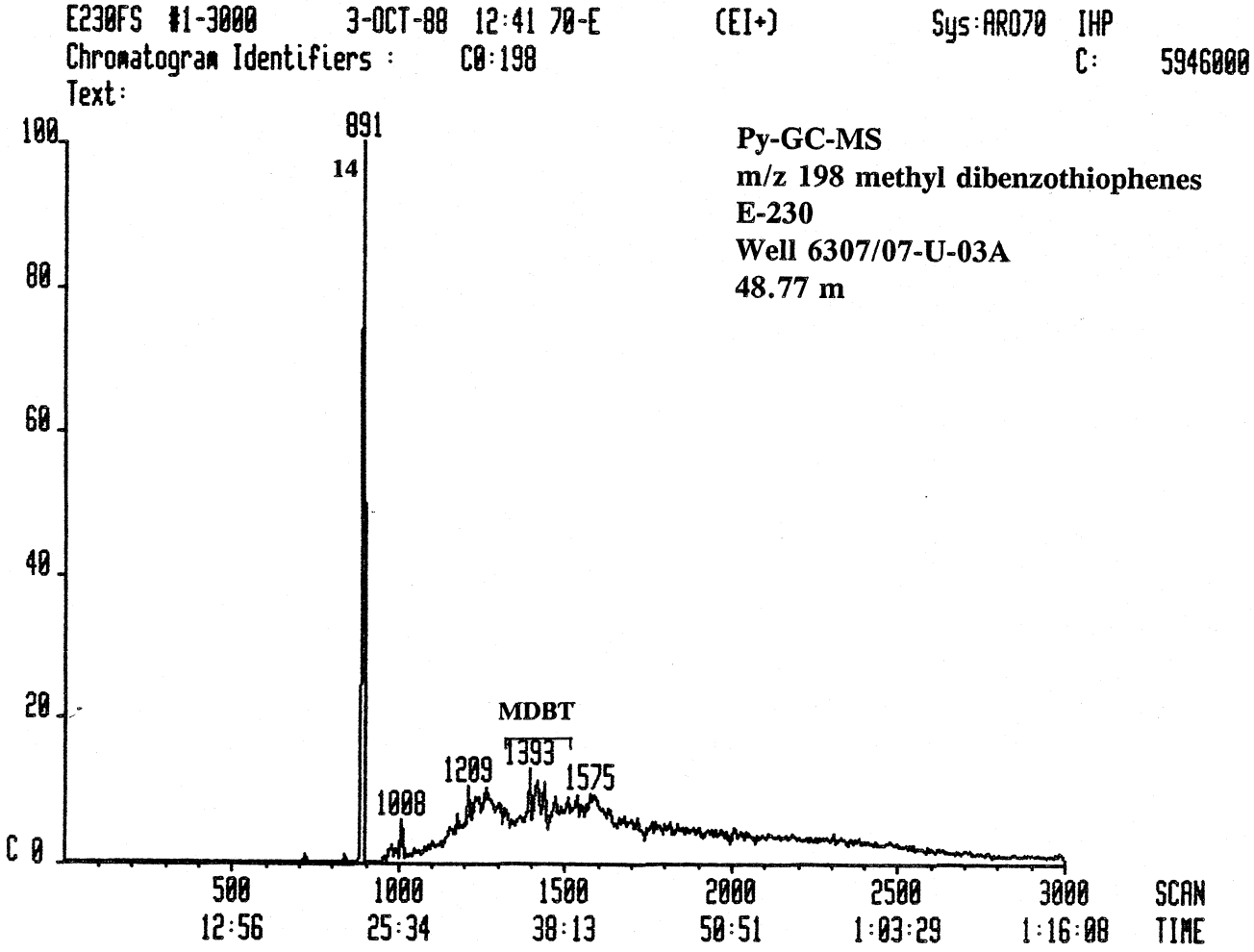
Py-GC-MS
m/z 184 dibenzothiophenes
E-227
Well 6307/07-U-03A
46.20 m



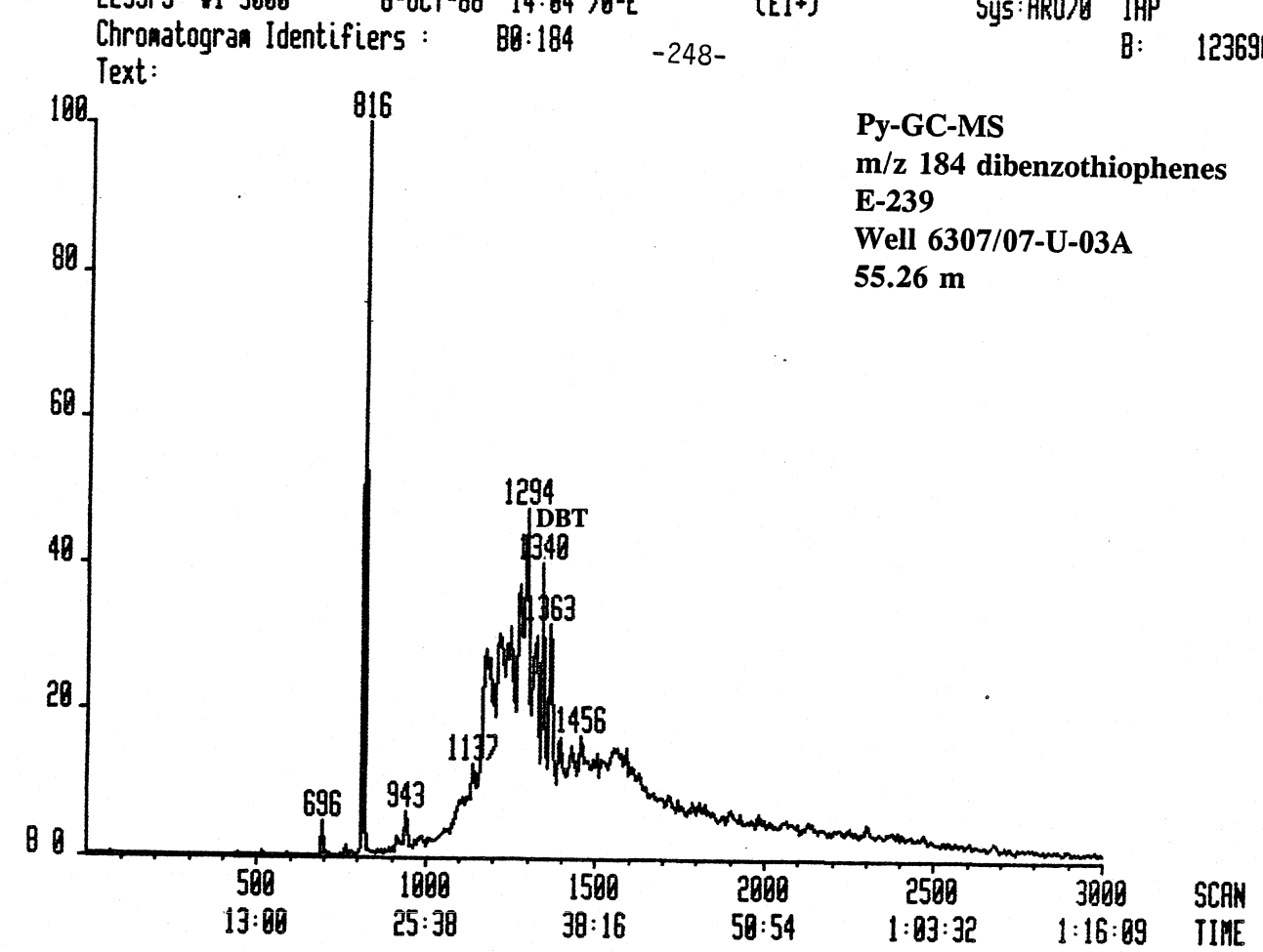
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-227
Well 6307/07-U-03A
46.20 m



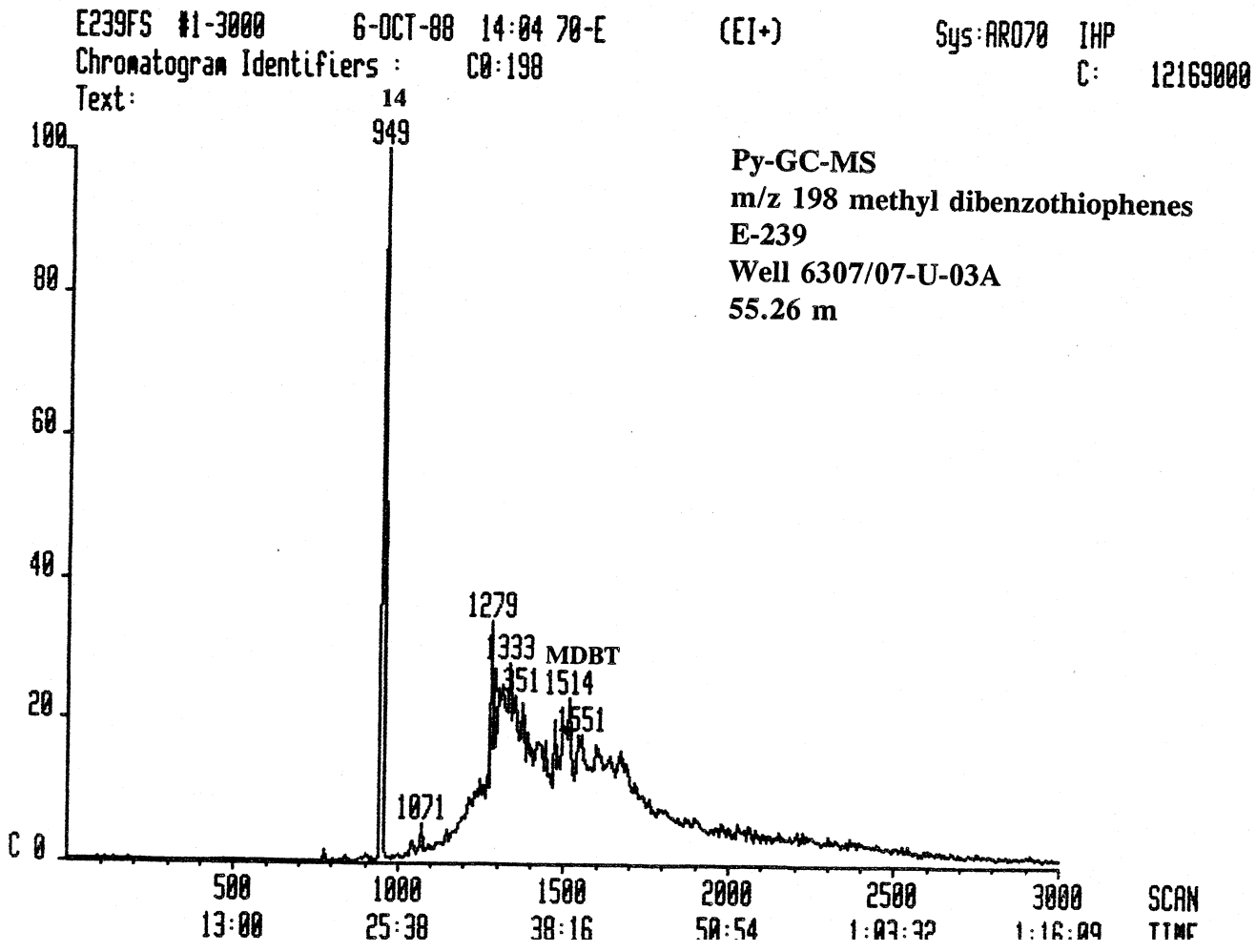
Py-GC-MS
m/z 184 dibenzothiophenes
E-230
Well 6307/07-U-03A
48.77 m



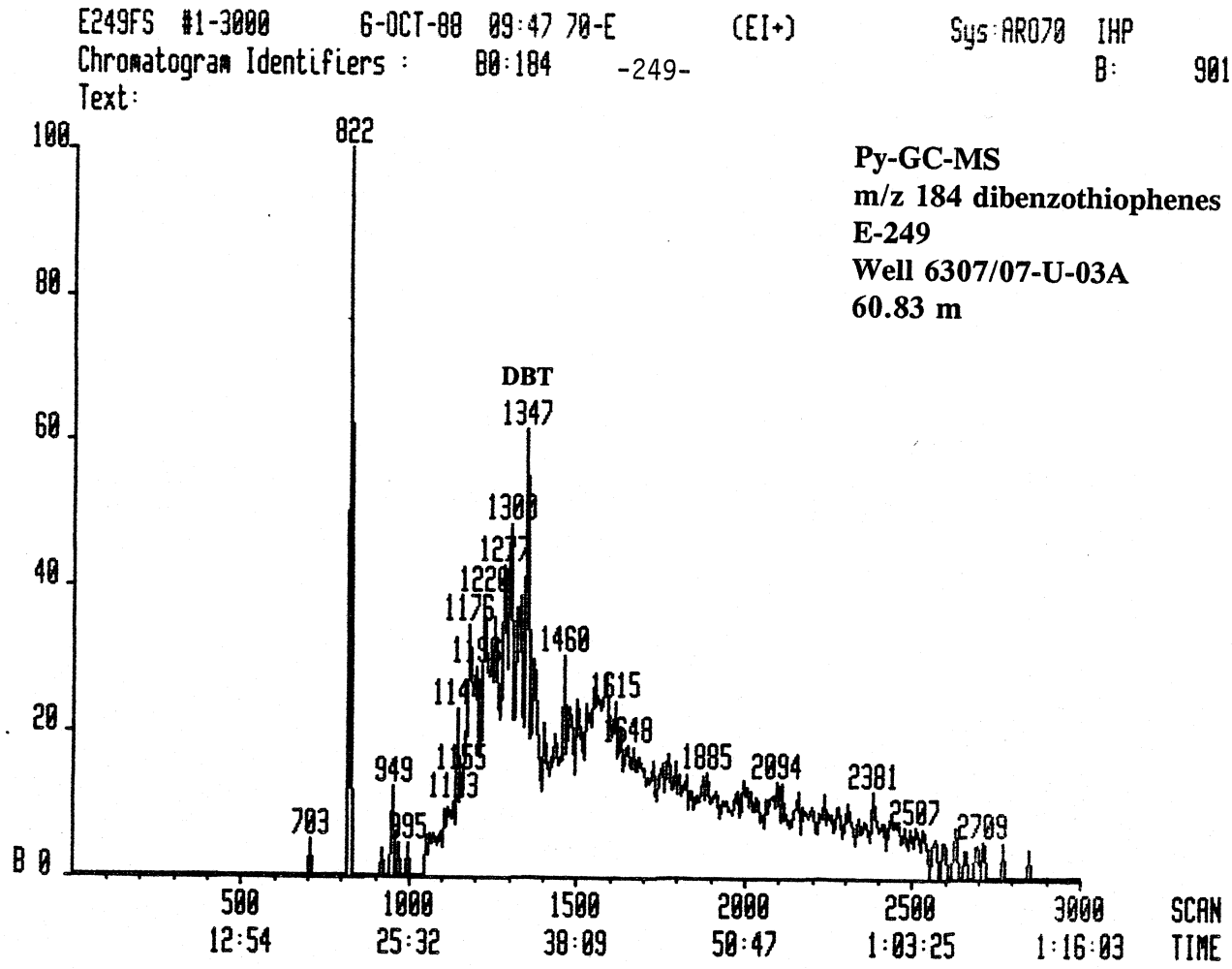
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-230
Well 6307/07-U-03A
48.77 m

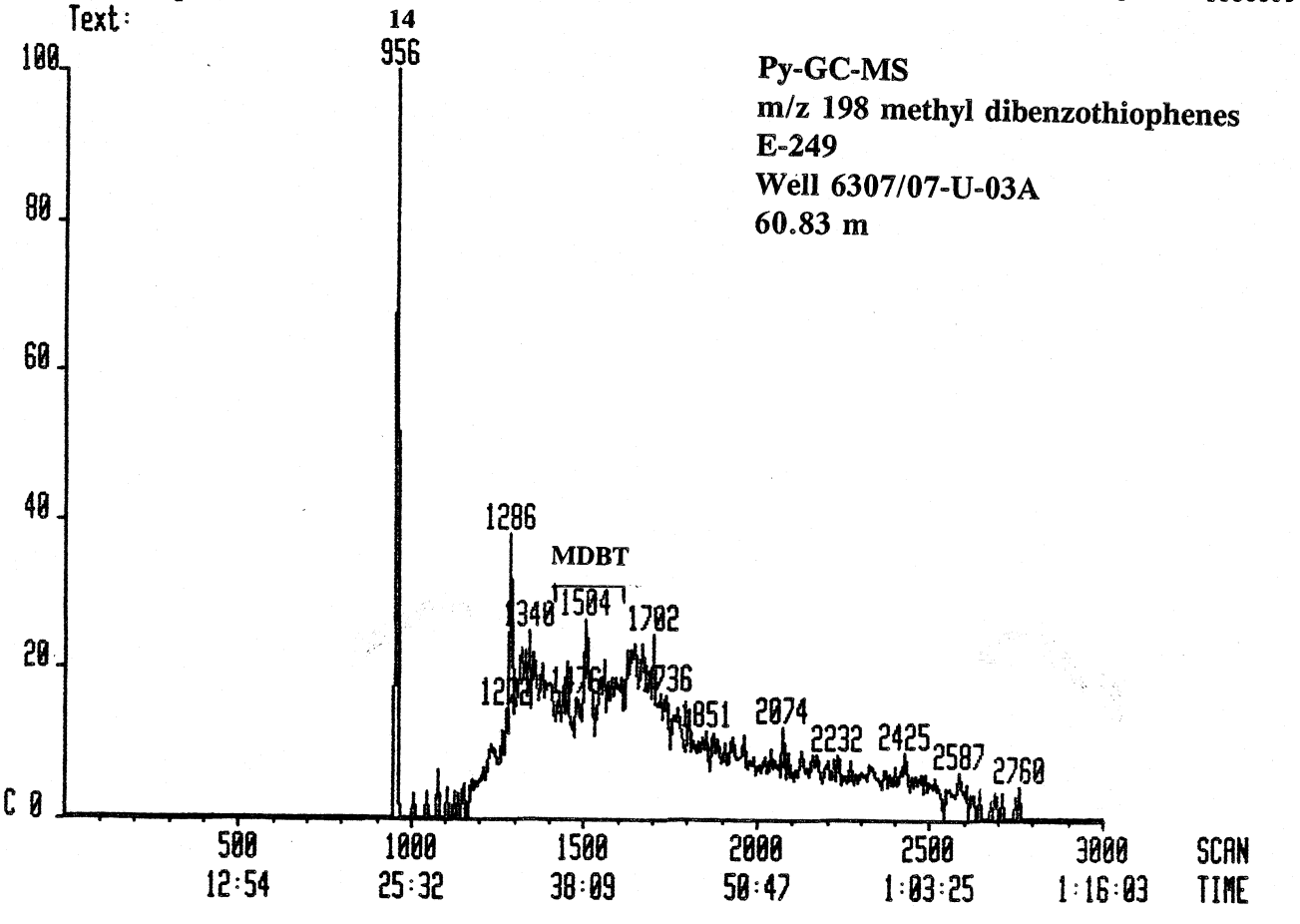


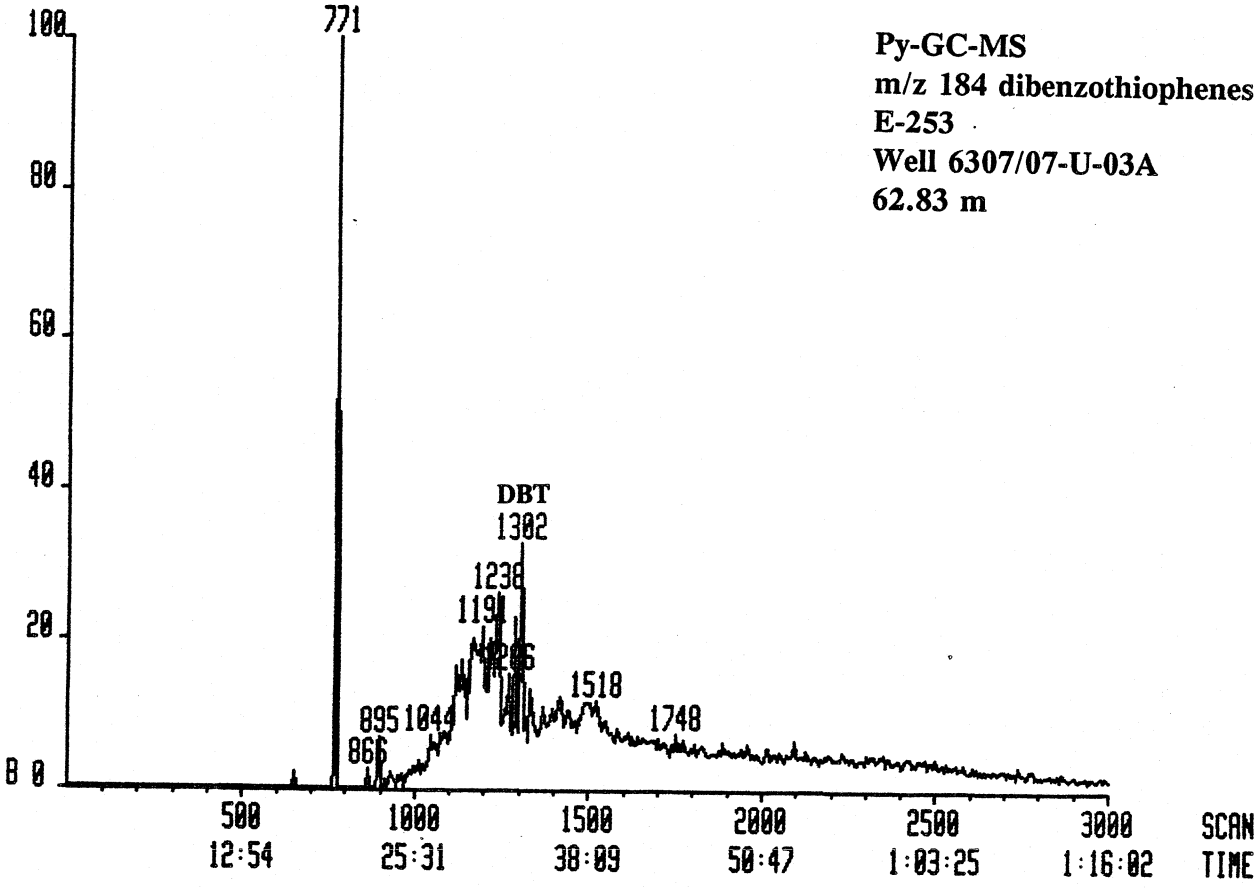
Py-GC-MS
m/z 184 dibenzothiophenes
E-239
Well 6307/07-U-03A
55.26 m



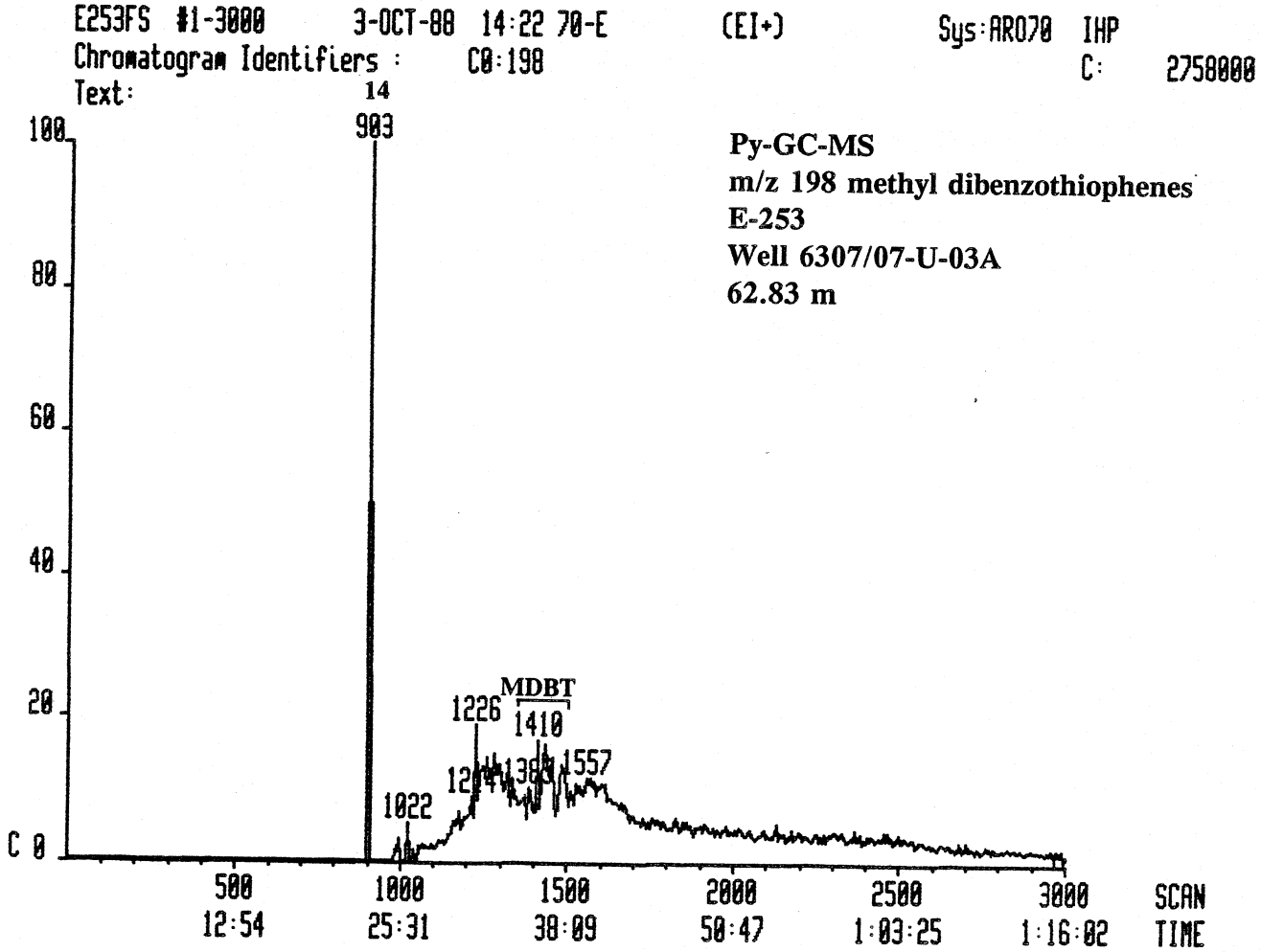
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-239
Well 6307/07-U-03A
55.26 m


E249FS #1-3000 6-OCT-88 09:47 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : B0:184 -249- B: 901000
Text:
Py-GC-MS
m/z 184 dibenzothiophenes
E-249
Well 6307/07-U-03A
60.83 m
DBT
822
1347
1460
1615
949
703
1885
2094
2381
2507
2709
SCAN TIME

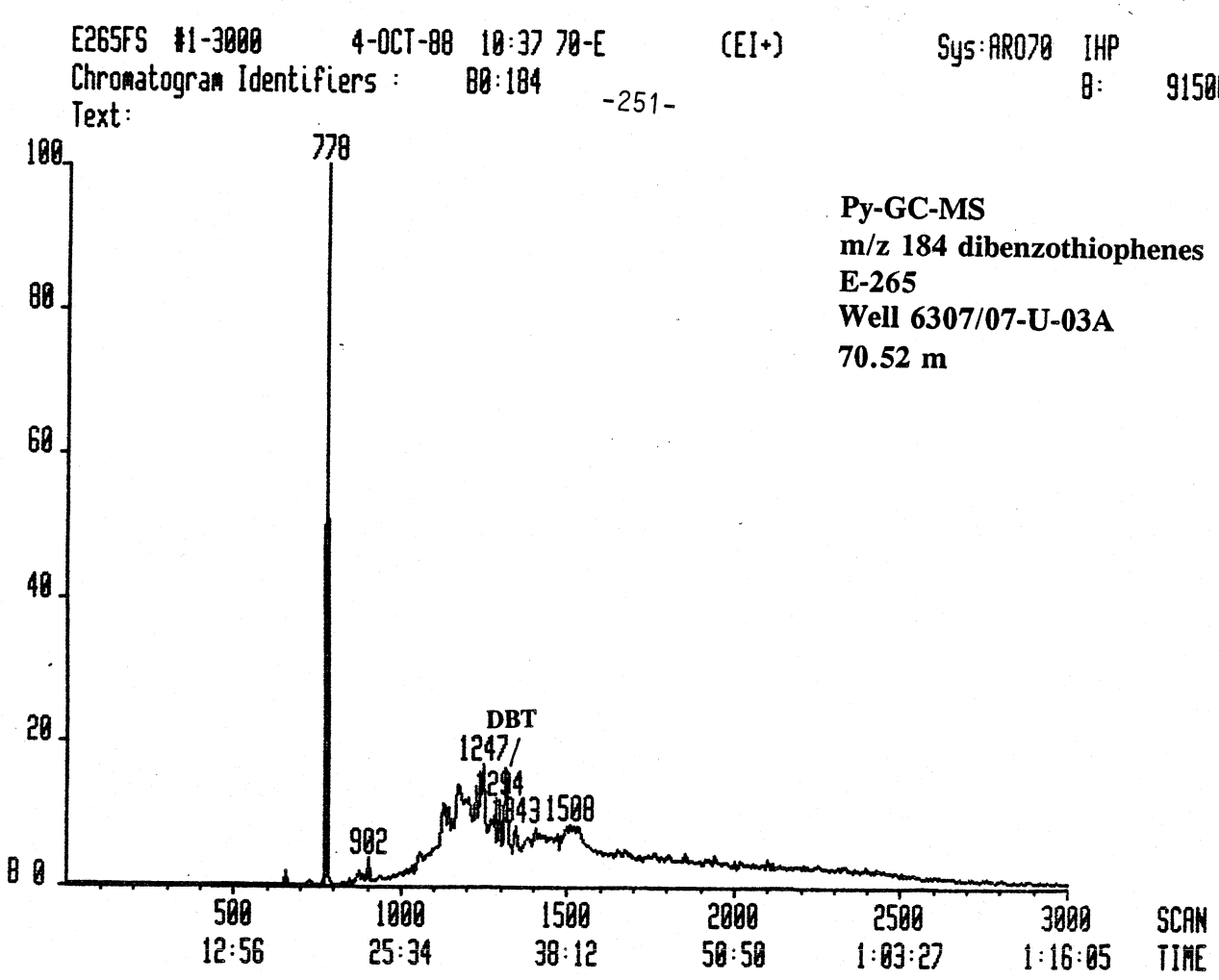

E249FS #1-3000 6-OCT-88 09:47 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:198 C: 1150000
Text:
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-249
Well 6307/07-U-03A
60.83 m
14
956
MDBT
1286
1504
1340
1702
1851
2074
2232
2425
2587
2760
SCAN TIME



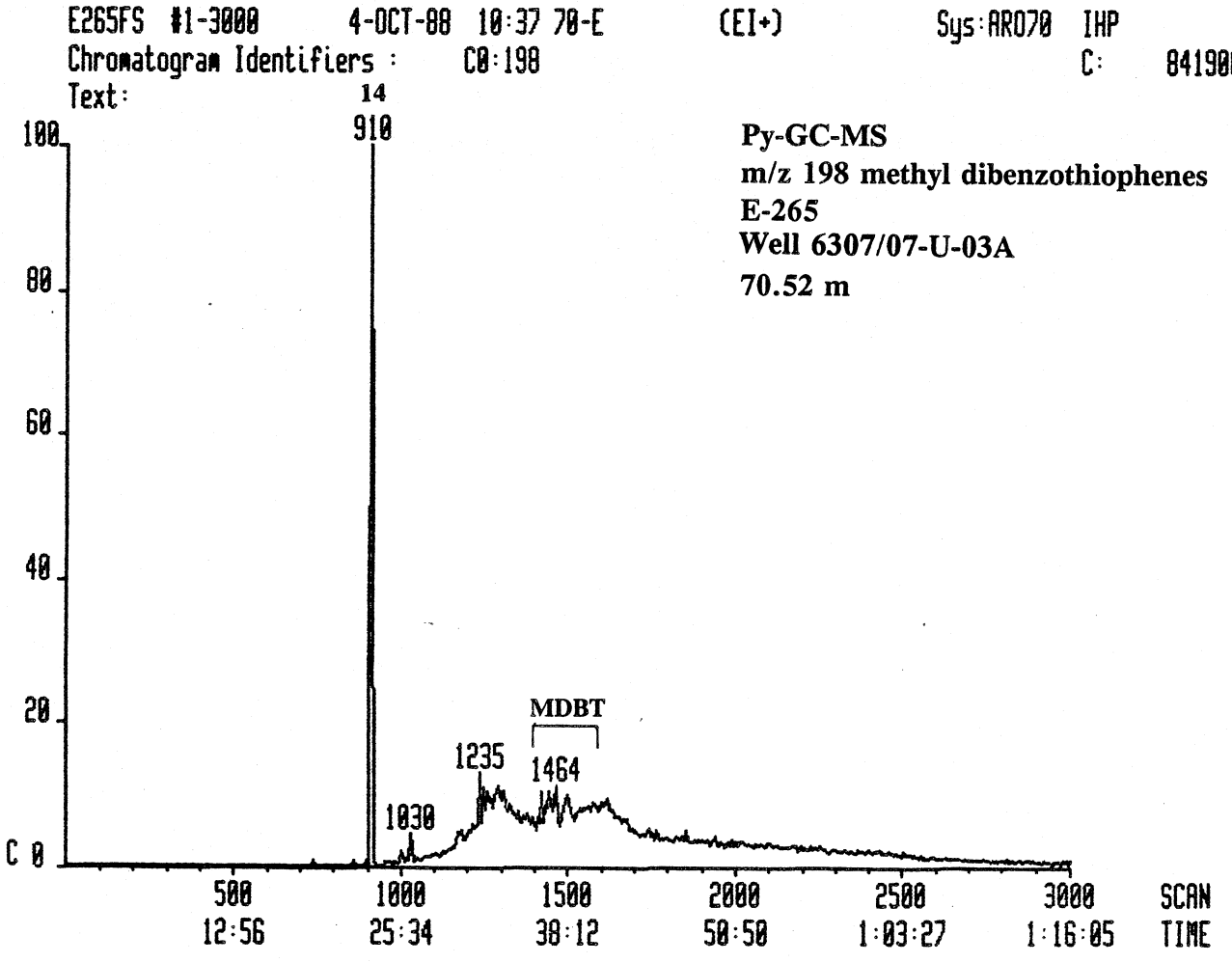
Py-GC-MS
m/z 184 dibenzothiophenes
E-253
Well 6307/07-U-03A
62.83 m



Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-253
Well 6307/07-U-03A
62.83 m



Py-GC-MS
m/z 184 dibenzothiophenes
E-265
Well 6307/07-U-03A
70.52 m



Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-265
Well 6307/07-U-03A
70.52 m

IKU SINTEF-GRUPPEN

Figure III.5.6g

PY-GC-MS

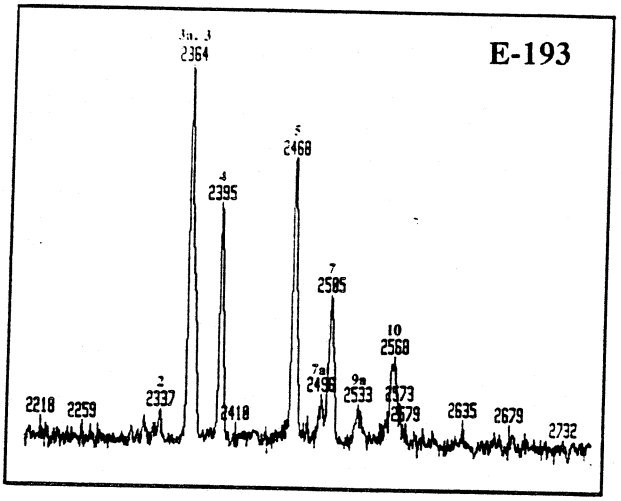
of

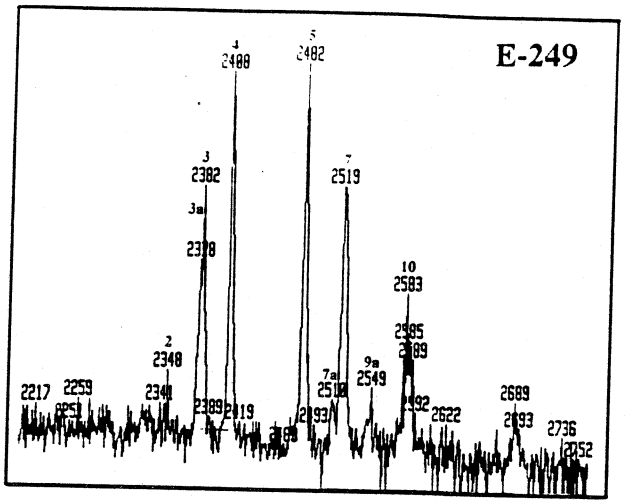
kerogens

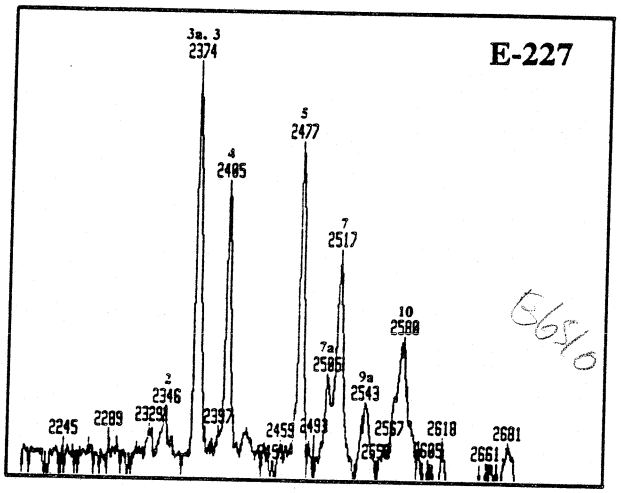
m/z 191

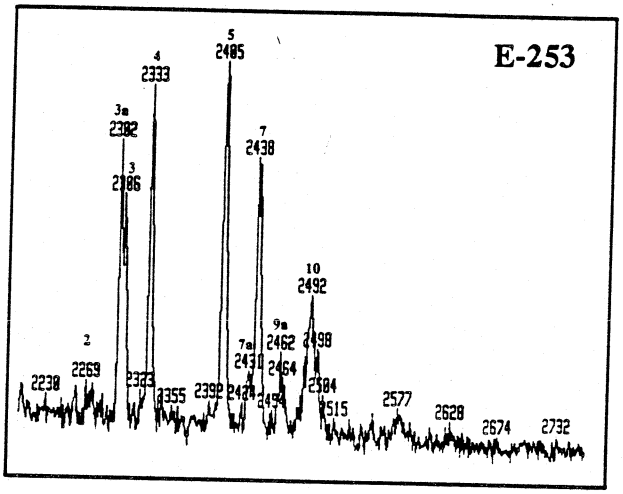
(Further identification of peaks, see section II)

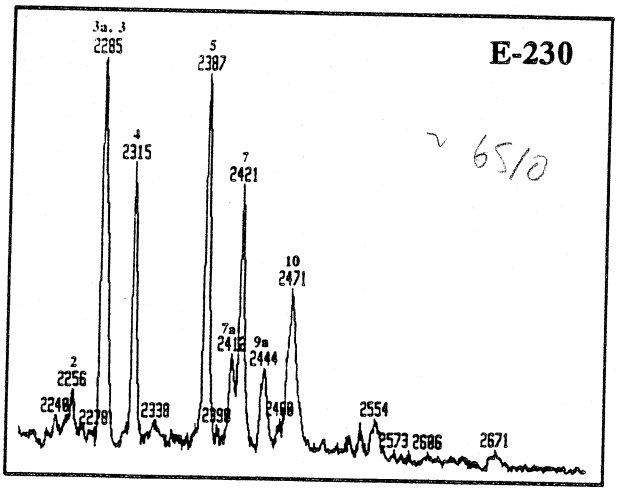
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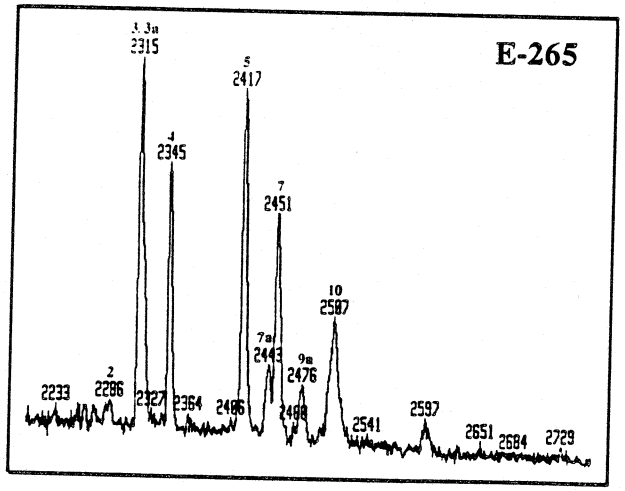


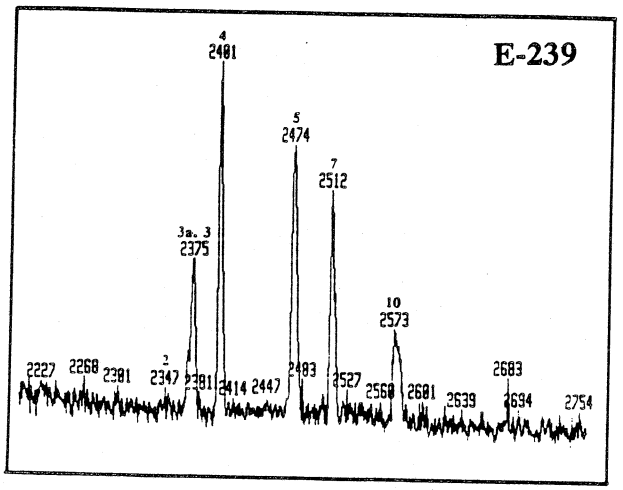


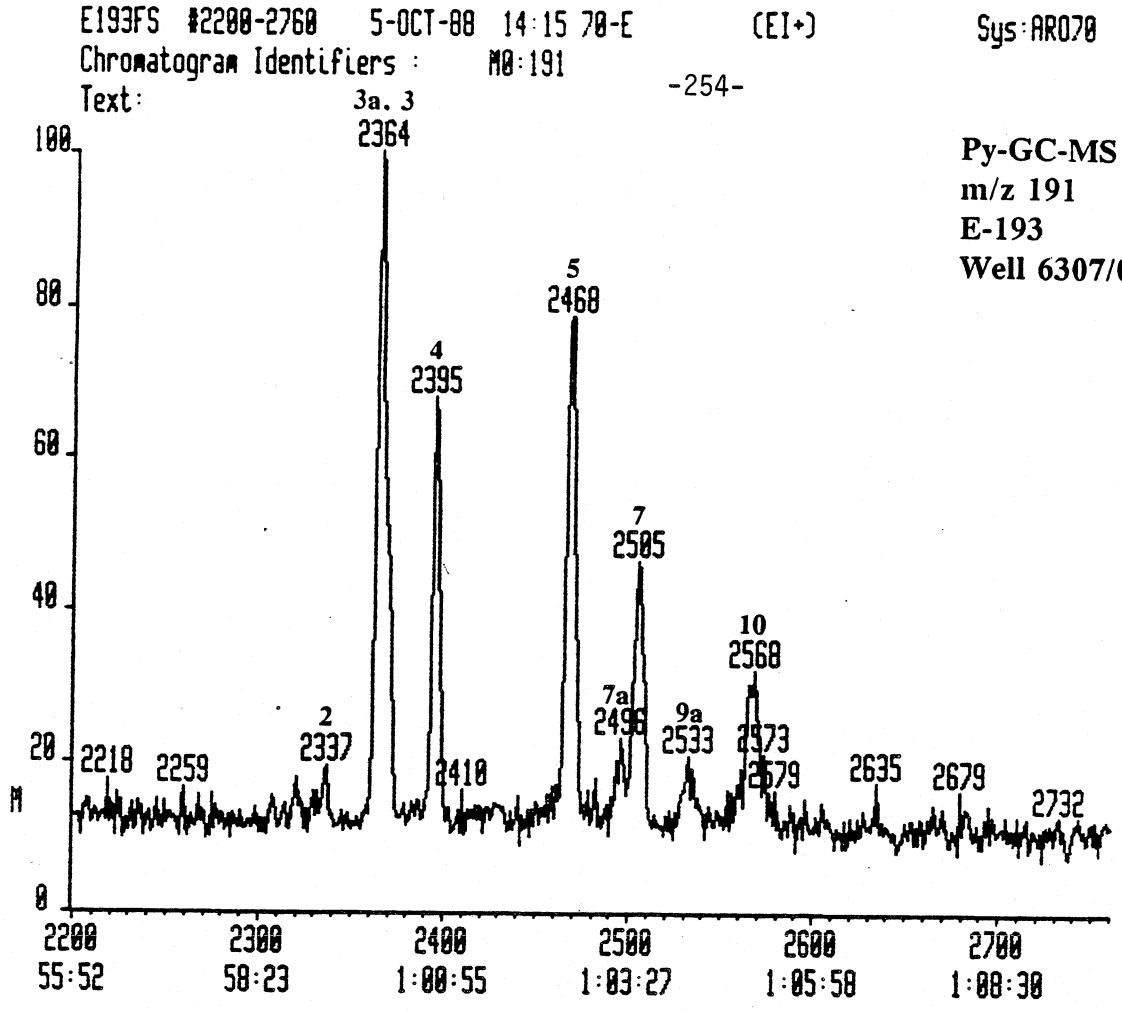




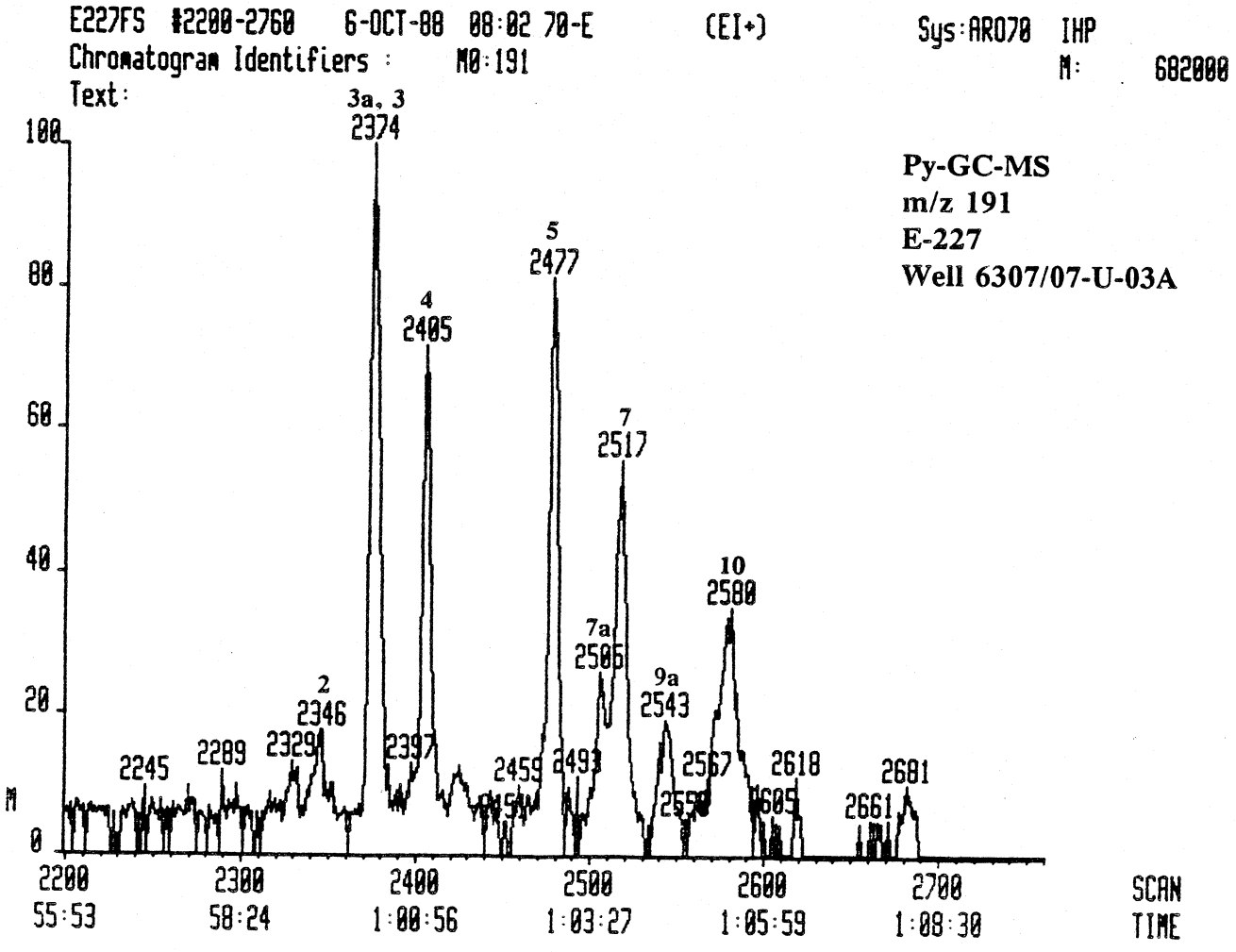




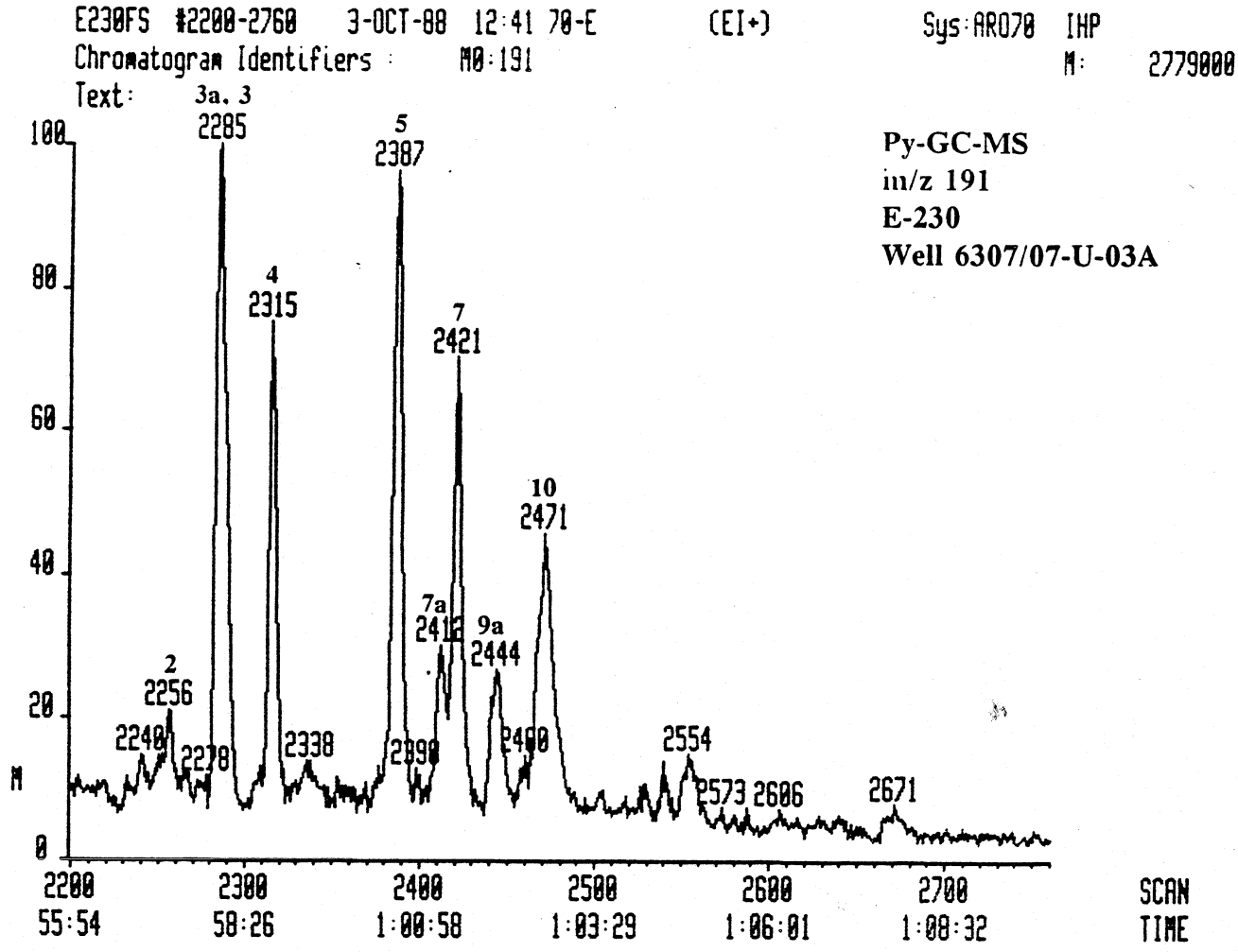


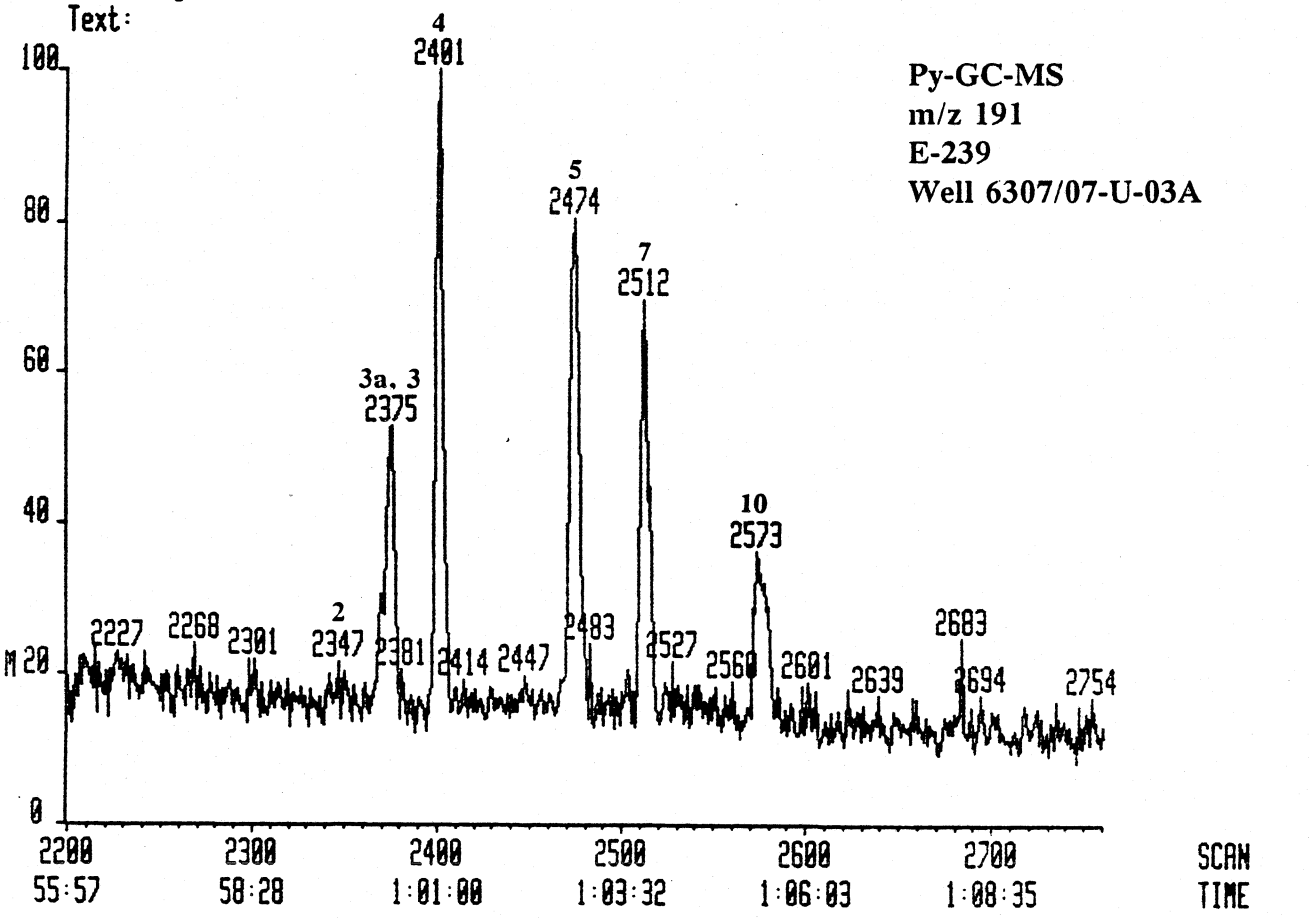


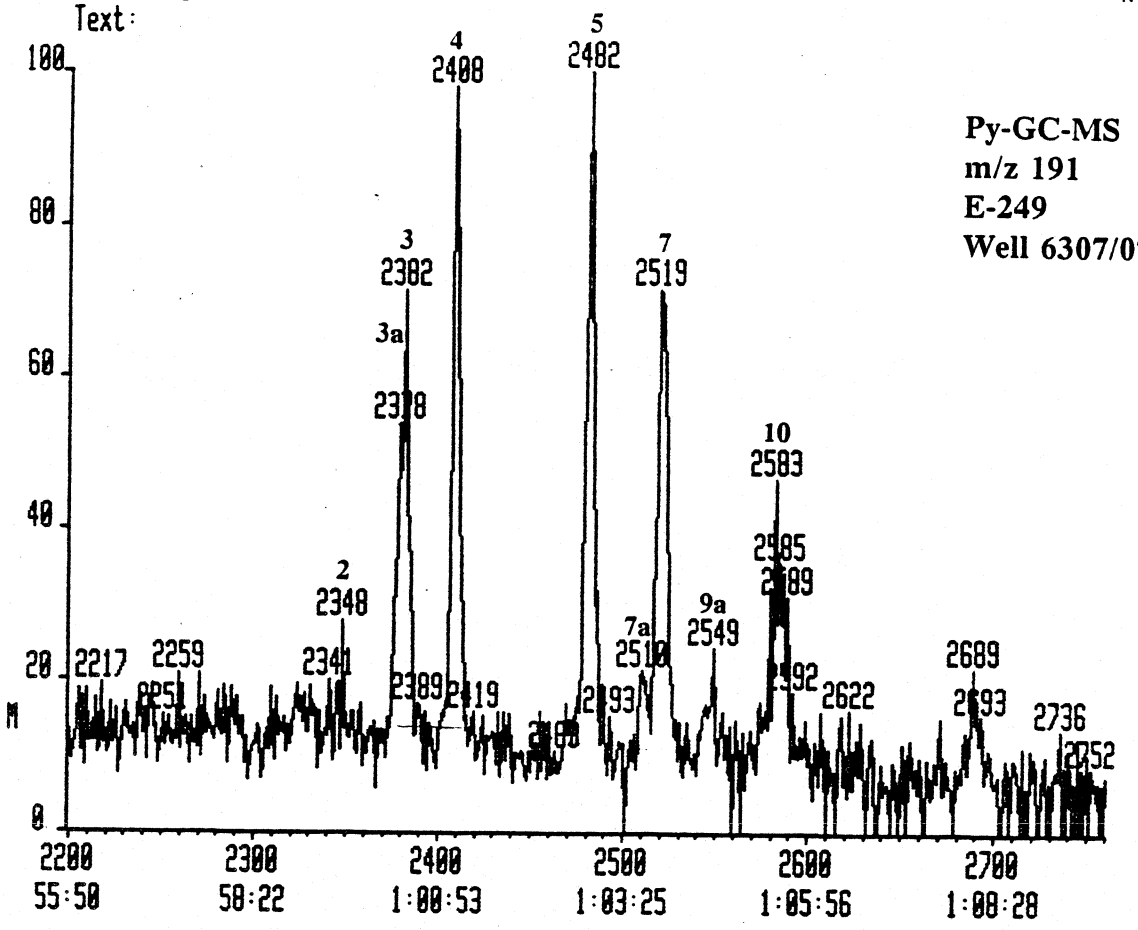
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m/z 191
E-193
Well 6307/07-U-03A



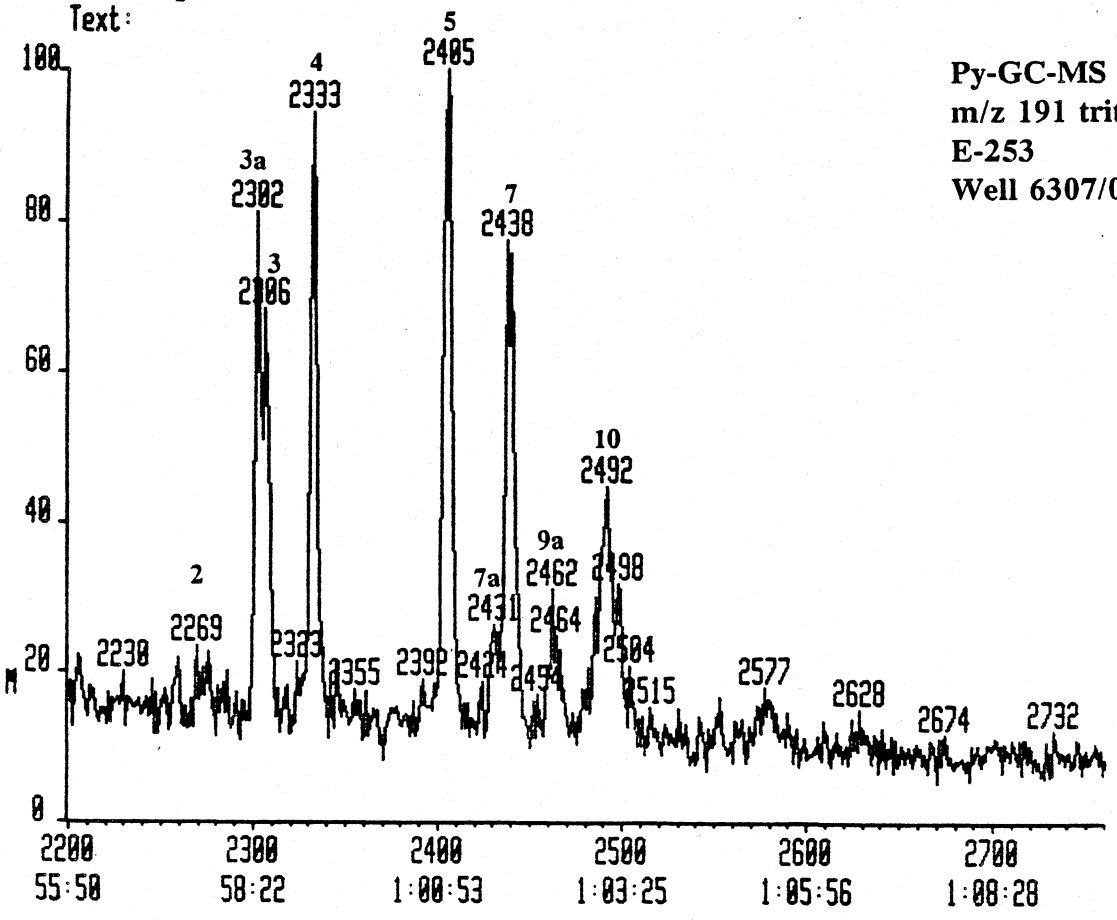
Py-GC-MS
m/z 191
E-227
Well 6307/07-U-03A


E230FS #2200-2760 3-OCT-88 12:41 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : M0:191 M: 2779000
Text:
3a, 3
2285
5
2387
4
2315
7
2421
10
2471
7a
2412
9a
2444
2
2256
2240
2278
2338
2398
2490
2554
2573
2606
2671
100
80
60
40
20
M
0
2200
2300
2400
2500
2600
2700
55:54
58:26
1:00:58
1:03:29
1:06:01
1:08:32
SCAN TIME
Py-GC-MS
m/z 191
E-230
Well 6307/07-U-03A

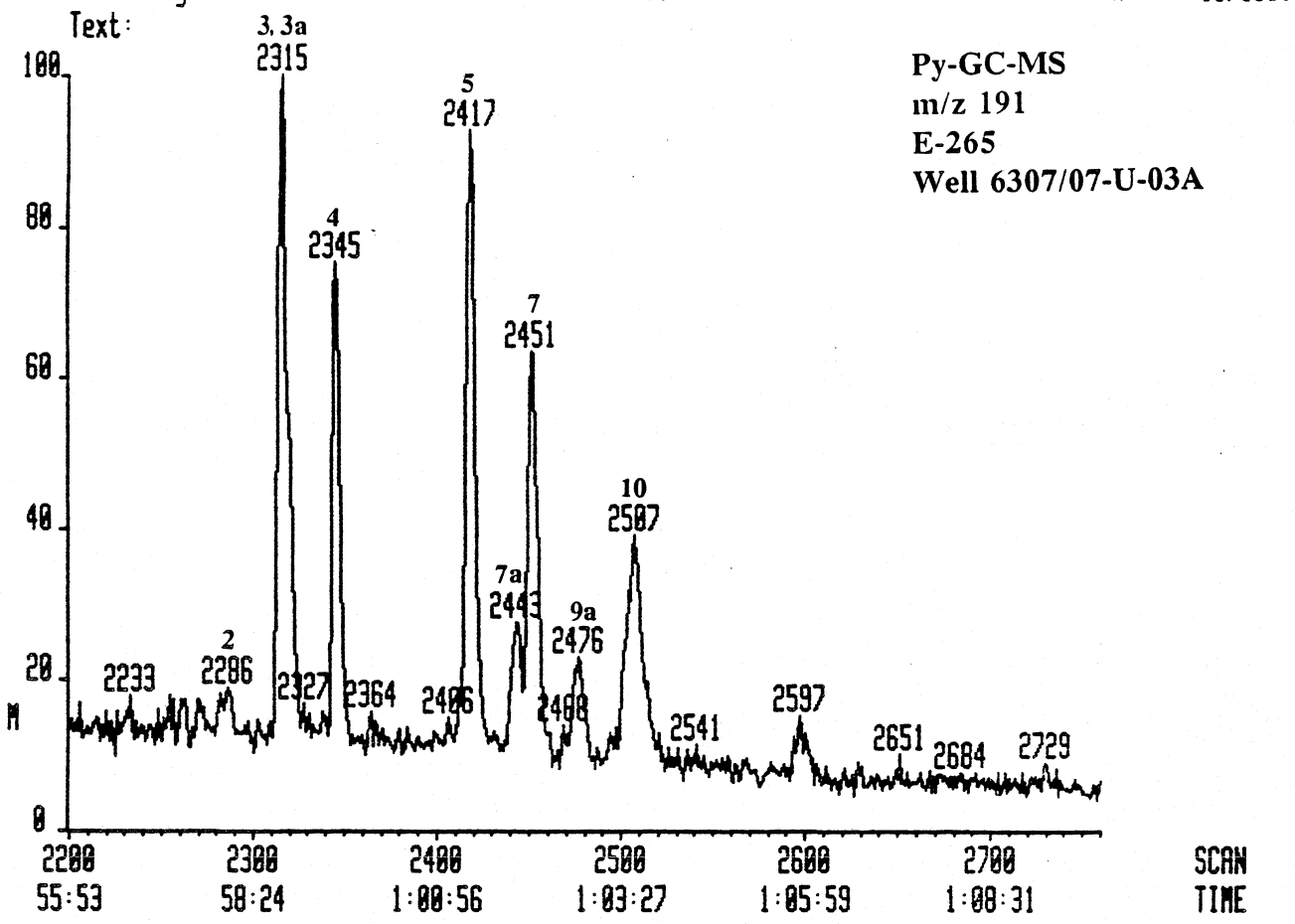

E239FS #2200-2760 6-OCT-88 14:04 70-E (EI+) Sys:AR070 IHP
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Text:
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2401
5
2474
7
2512
3a, 3
2375
10
2573
2
2347
2227
2268
2301
2381
2414
2447
2483
2527
2560
2601
2639
2683
2694
2754
100
80
60
40
M 20
0
2200
2300
2400
2500
2600
2700
55:57
58:28
1:01:00
1:03:32
1:06:03
1:08:35
SCAN TIME
Py-GC-MS
m/z 191
E-239
Well 6307/07-U-03A



Py-GC-MS
m/z 191
E-249
Well 6307/07-U-03A



Py-GC-MS
m/z 191 triterp.
E-253
Well 6307/07-U-03A


E265FS #2200-2760 4-OCT-88 10:37 70-F (EI+) Sys:AR070 IHP
Chromatogram Identifiers : M0:191 -257- M: 1976000
Text:
Py-GC-MS
m/z 191
E-265
Well 6307/07-U-03A
3,3a
2315
5
2417
4
2345
7
2451
10
2587
7a
2443
9a
2476
2
2286
2233
2327
2364
2406
2488
2541
2597
2651
2684
2729
100
80
60
40
20
0
M
2200
55:53
2300
58:24
2400
1:00:56
2500
1:03:27
2600
1:05:59
2700
1:08:31
SCAN
TIME

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Figure III.5.7

Huminite reflectance histograms

Key:

A = Grey-black-brown claystone.
Upper case letters indicate values included in the main population. Lower case letters represent values in other populations.

PP = Statistical data populations
Y = Main population, not necessarily representative of sample maturity,
N = Other populations.

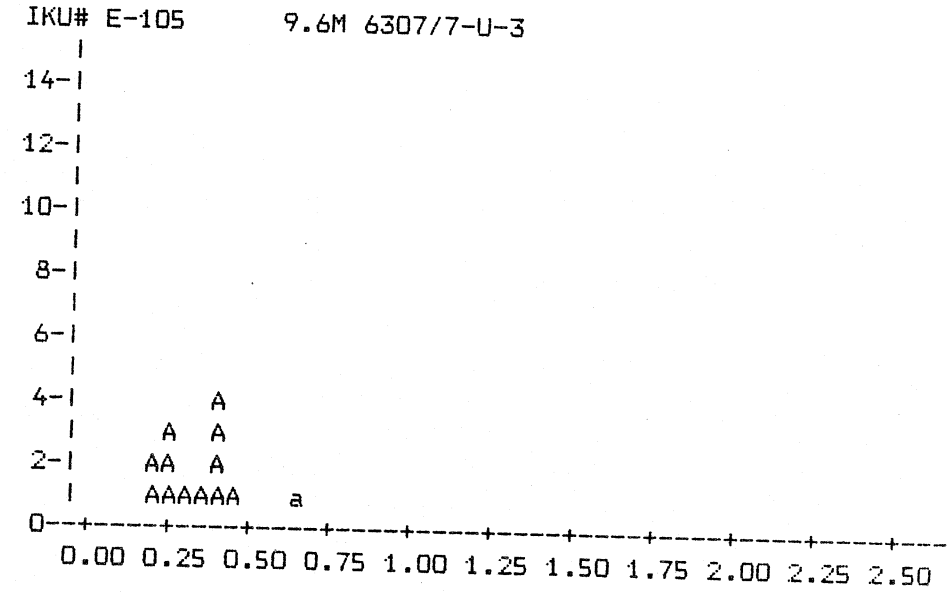
LOW+HIGH = Population limits

VAL. = Number of measurements in that population

Lithology cross-reference table

A = Clst. gy
B = Clst. dk gy
C = Clst. gn
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbargillite
N = Siltstone
O = Bit
P = X

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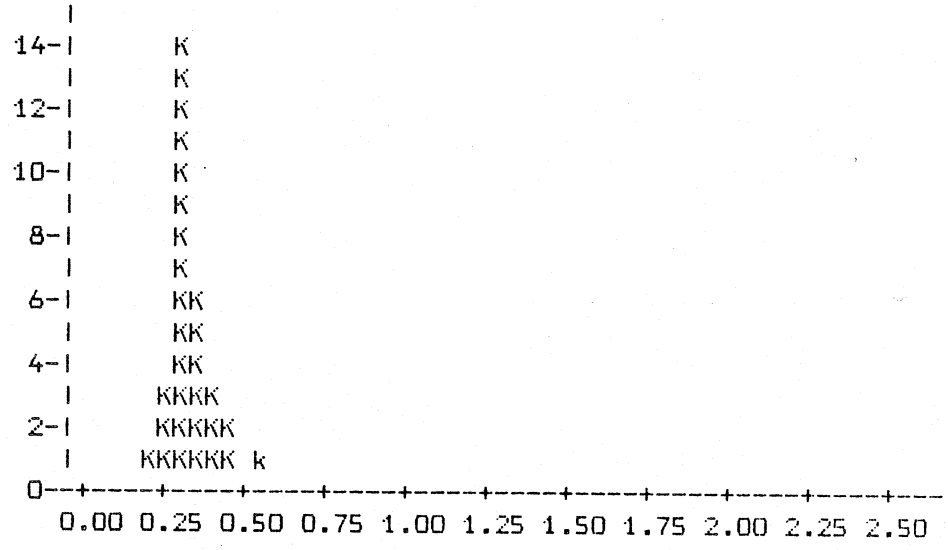
PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.21	0.48	ALL	12	0.33	0.09
N	0.69	0.70	ALL	1	0.69	0.00
			OVERALL	13	0.36	0.13

ORDERED VALUES FOLLOW:

0.21A 0.22A 0.25A 0.26A 0.26A 0.33A 0.36A 0.40A 0.40A 0.41A 0.42A
0.47A 0.69a

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PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.23	0.50	ALL	29	0.33	0.06
N	0.56	0.57	ALL	1	0.56	0.00
			OVERALL	30	0.34	0.07

ORDERED VALUES FOLLOW:

0.23K 0.25K 0.25K 0.26K 0.30K 0.30K 0.30K 0.30K 0.30K 0.30K 0.30K
0.31K 0.32K 0.32K 0.32K 0.32K 0.32K 0.34K 0.35K 0.35K 0.35K 0.36K
0.38K 0.38K 0.40K 0.40K 0.44K 0.45K 0.49K 0.56k

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III.6 CORE 6307/07-U-02

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TABLES

Core 6307/07-U-02

Table III.6.1 *Analytical programme, follow-up analyses Argillaceous rocks*

IKU no.	Depth (m)		HI	TOC	1 VI	2 TAI/ SCI	3 Extr.	4 MPLC	5 CGC-SAT	6 CGC-ARO	7 Urea add.	8 CGC/ cycl	9 CGC n-alk	10 GC-MS Br./cycl	11 PY-GC-MS (ker)	12 $\delta^{13}C$ (ker)	13 δD (ker)
E-619	34.83	Lange 1	212	4.06		X	X	X	X		X		X	X	X		
E-627	38.43	Spekk 2	419	5.70		X	X										
E-630	40.28	"	267	1.83		X	X	X	X								
E-632	40.78	"	437	6.54		X	X	X	X		X		X	X		X	
E-640	44.16	"	432	6.64		X	X	X	X								
E-646	47.56	"	350	6.33		X	X	X	X	X	X	X	X	X	X	X	X
E-648	60.79	"	418	6.60			X	X	X								
E-707	72.25	"	454	8.37			X	X	X								
E-718	80.07	"	456	7.32		X	X	X	X		X	X	X	X	X	X	X
E-729	83.69	"	447	6.44			X										
E-738	87.34	"	426	6.30			X										
E-745	90.85	"	261	6.39			X										
E-752	93.85	"	425	7.77			X										
E-764	100.38	"	381	7.34			X										
E-765	101.42	"	450	8.09		X	X	X	X		X	X	X	X	X	X	X
Total number of samples					0	8	15	9	9	1	5	3	5	5	4	4	3

IKU SINTEF-GRUPPEN

IKU SINTEF-GRUPPEN

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Table III.6.2a TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0616	32.30	1920	12	0	0	0	0	1932	12	0.6	
E0652	50.18	5903	56	9	2	0	0	5970	67	1.1	
E0697	67.05	31991	301	73	24	19	0	32408	417	1.3	1.26
E0706	71.98	11170	24	6	0	2	0	11202	32	0.3	0.00
E0786	122.11	2543	0	0	0	0	0	2543	0	0.0	
E0795	134.44	783	0	0	0	0	0	783	0	0.0	
E0801	141.42	1523	0	0	0	0	0	1523	0	0.0	
E0804	147.55	889	0	6	0	0	0	895	6	0.7	
E0805	150.60	1439	0	0	0	0	0	1439	0	0.0	
E0809	157.94	425	0	0	0	0	0	425	0	0.0	
E0820	182.57	616	0	0	0	0	0	616	0	0.0	

Table III.6.2b TABLE OF GAS RESULTS

Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0616	32.30	125	4	0	0	0	0	129	4	3.1	
E0652	50.18	36136	2613	1242	313	276	367	40580	4444	11.0	1.13
E0697	67.05	24631	1620	1341	524	530	978	28646	4015	14.0	0.99
E0706	71.98	51874	964	776	330	346	685	54290	2416	4.5	0.95
E0786	122.11	863	19	3	0	0	0	885	22	2.5	
E0795	134.44	1295	27	20	0	0	0	1342	47	3.5	
E0801	141.42	760	29	8	0	0	0	797	37	4.6	
E0804	147.55	775	27	15	0	0	0	817	42	5.1	
E0805	150.60	149	12	0	0	0	0	161	12	7.5	
E0809	157.94	440	10	0	0	0	0	450	10	2.2	
E0820	182.57	668	35	17	0	0	0	720	52	7.2	

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Table III.6.2c TABLE OF GAS RESULTS

Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
E0616	32.30	2045	16	0	0	0	0	2061	16	0.8	
E0652	50.18	42039	2669	1251	315	276	367	46550	4511	9.7	1.14
E0697	67.05	56622	1921	1414	548	549	978	61054	4432	7.3	1.00
E0706	71.98	63044	988	782	330	348	685	65492	2448	3.7	0.95
E0786	122.11	3406	19	3	0	0	0	3428	22	0.6	
E0795	134.44	2078	27	20	0	0	0	2125	47	2.2	
E0801	141.42	2283	29	8	0	0	0	2320	37	1.6	
E0804	147.55	1664	27	21	0	0	0	1712	48	2.8	
E0805	150.60	1588	12	0	0	0	0	1600	12	0.8	
E0809	157.94	865	10	0	0	0	0	875	10	1.1	
E0820	182.57	1284	35	17	0	0	0	1336	52	3.9	

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Table III.6.3 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0582	BULK	15.66	CORE	0.24
E0589	BULK	18.35	CORE	0.16
E0591	BULK	19.42	CORE	0.18
E0592	BULK	20.02	CORE	0.20
E0594	BULK	20.82	CORE	0.17
E0600	BULK	21.23	CORE	0.31
E0596	BULK	21.73	CORE	0.22
E0598	BULK	22.73	CORE	0.17
E0601	BULK	25.12	CORE	0.51
E0605	BULK	26.42	CORE	0.32
E0607	BULK	27.65	CORE	2.36
E0610	BULK	28.65	CORE	0.33
E0611	BULK	29.65	CORE	0.44
E5006	BULK	30.00	CORE	0.26
E0612	BULK	30.75	CORE	0.29
E5009	BULK	31.00	CORE	0.38
E0614	BULK	31.25	CORE	0.48
E0615	BULK	31.75	CORE	0.36
E0617	BULK	32.75	CORE	1.99
E0618	BULK	33.98	CORE	2.13
E0619	BULK	34.83	CORE	4.06
E0619	FOLLOW-UP	34.83	CORE	1.34
E5030	BULK	36.25	CORE	4.29
E0622	BULK	36.29	CORE	2.51
E5032	BULK	36.75	CORE	6.15
E0623	BULK	36.93	CORE	7.60
E0624	BULK	37.43	CORE	4.09
E0626	BULK	37.93	CORE	4.14
E5036	BULK	38.15	CORE	5.04
E0627	BULK	38.43	CORE	5.70
E5038	BULK	38.60	CORE	5.47
E0628	BULK	38.93	CORE	4.69
E5039	BULK	39.15	CORE	3.48
E0629	BULK	39.78	CORE	2.50
E5042	BULK	40.00	CORE	3.41
E0630	BULK	40.28	CORE	1.83
E0630	FOLLOW-UP	40.28	CORE	3.11
E5044	BULK	40.50	CORE	3.65
E0632	BULK	40.78	CORE	6.54
E0632	FOLLOW-UP	40.78	CORE	6.97
E0634	BULK	41.28	CORE	6.17
E0635	BULK	41.78	CORE	7.03
E5049	BULK	42.25	CORE	5.09

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Date : 88.10.17

Table 6.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0636	BULK	42.66	CORE	2.87
E0637	BULK	43.16	CORE	3.89
E5052	BULK	43.30	CORE	4.07
E0638	BULK	43.66	CORE	7.13
E0640	BULK	44.16	CORE	6.64
E0640	FOLLOW-UP	44.16	CORE	6.58
E0641	BULK	44.66	CORE	6.26
E5056	BULK	44.90	CORE	6.07
E5058	BULK	45.25	CORE	6.28
E0642	BULK	45.46	CORE	5.27
E0643	BULK	46.16	CORE	6.84
E0644	BULK	46.66	CORE	8.10
E0645	BULK	47.16	CORE	6.94
E0646	BULK	47.56	CORE	6.33
E0646	FOLLOW-UP	47.56	CORE	6.23
E5065	BULK	47.75	CORE	6.13
E0648	BULK	48.06	CORE	5.83
E5066	BULK	48.25	CORE	5.68
E0656	BULK	48.46	CORE	5.69
E0649	BULK	48.96	CORE	6.54
E5069	BULK	49.25	CORE	5.88
E0650	BULK	49.46	CORE	5.82
E0651	BULK	49.96	CORE	6.56
E0652	BULK	50.18	CORE	5.70
E5074	BULK	50.30	CORE	5.99
E0657	BULK	50.69	CORE	6.60
E5075	BULK	50.90	CORE	5.82
E0658	BULK	51.19	CORE	6.79
E5077	BULK	51.30	CORE	5.87
E0659	BULK	51.69	CORE	5.32
E0660	BULK	52.19	CORE	6.10
E0661	BULK	52.69	CORE	6.46
E0662	BULK	53.19	CORE	5.21
E0663	BULK	53.21	CORE	5.48
E5082	BULK	53.50	CORE	5.82
E0667	BULK	54.21	CORE	5.27
E0668	BULK	54.71	CORE	5.75
E0669	BULK	55.21	CORE	6.03
E0670	BULK	55.71	CORE	4.40
E0672	BULK	56.38	CORE	6.28
E0673	BULK	56.79	CORE	6.05
E0674	BULK	57.29	CORE	6.44
E0675	BULK	57.79	CORE	5.37

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IKU SINTEF-GRUPPEN

Table III.6.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0676	BULK	58.29	CORE	6.58
E0677	BULK	58.79	CORE	5.53
E5102	BULK	59.25	CORE	5.25
E0679	BULK	59.79	CORE	7.17
E5106	BULK	60.25	CORE	6.33
E5107	BULK	60.50	CORE	6.42
E0684	BULK	60.79	CORE	6.60
E0684	FOLLOW-UP	60.79	CORE	6.25
E5110	BULK	61.25	CORE	6.49
E0685	BULK	61.65	CORE	7.18
E5111	BULK	61.90	CORE	6.72
E0686	BULK	62.15	CORE	6.80
E0687	BULK	62.65	CORE	7.26
E0688	BULK	63.15	CORE	7.55
E5115	BULK	63.40	CORE	7.81
E0689	BULK	63.65	CORE	8.35
E0690	BULK	64.15	CORE	5.96
E0691	BULK	64.65	CORE	5.42
E5121	BULK	65.15	CORE	6.54
E0693	BULK	65.40	CORE	5.76
E0694	BULK	65.90	CORE	6.52
E5123	BULK	66.15	CORE	6.54
E0695	BULK	66.40	CORE	6.66
E0696	BULK	66.90	CORE	6.48
E0697	BULK	67.05	CORE	6.39
E5128	BULK	67.40	CORE	6.45
E5130	BULK	67.90	CORE	6.84
E5132	BULK	68.15	CORE	7.38
E5134	BULK	68.65	CORE	6.15
E5137	BULK	69.15	CORE	8.03
E5139	BULK	69.65	CORE	6.78
E5142	BULK	70.15	CORE	7.61
E0700	BULK	70.75	CORE	9.24
E0701	BULK	71.23	CORE	6.46
E0705	BULK	71.73	CORE	7.54
E0706	BULK	71.98	CORE	7.66
E0707	BULK	72.25	CORE	8.37
E0707	FOLLOW-UP	72.25	CORE	8.38
E0708	BULK	72.71	CORE	7.94
E0710	BULK	73.21	CORE	6.95
E5153	BULK	74.00	CORE	7.00
E0711	BULK	74.21	CORE	7.92
E0712	BULK	74.71	CORE	7.16

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Table 6.3 (cont.) DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0713	BULK	75.21	CORE	7.24
E0714	BULK	75.71	CORE	7.04
E0721	BULK	76.22	CORE	6.73
E5162	BULK	77.00	CORE	7.86
E0723	BULK	77.22	CORE	7.78
E5165	BULK	77.75	CORE	4.92
E0724	BULK	78.22	CORE	6.84
E5169	BULK	78.75	CORE	6.27
E0717	BULK	79.37	CORE	4.04
E5172	BULK	79.60	CORE	7.43
E0718	BULK	80.07	CORE	7.32
E0718	FOLLOW-UP	80.07	CORE	7.58
E5174	BULK	80.50	CORE	8.46
E5176	BULK	81.00	CORE	8.02
E0720	BULK	81.27	CORE	7.24
E5179	BULK	81.50	CORE	8.33
E5180	BULK	82.00	CORE	8.30
E0725	BULK	82.19	CORE	8.07
E0726	BULK	82.69	CORE	7.71
E0727	BULK	83.19	CORE	7.80
E0729	BULK	83.69	CORE	6.44
E0730	BULK	84.19	CORE	6.36
E5189	BULK	84.50	CORE	6.79
E0731	BULK	84.69	CORE	5.25
E5190	BULK	85.00	CORE	6.28
E0732	BULK	85.34	CORE	6.40
E5192	BULK	85.60	CORE	7.17
E0734	BULK	85.84	CORE	7.29
E0735	BULK	86.34	CORE	7.48
E0737	BULK	86.84	CORE	7.58
E0738	BULK	87.34	CORE	6.30
E0739	BULK	87.84	CORE	6.53
E5200	BULK	88.00	CORE	6.20
E0740	BULK	88.35	CORE	5.38
E0741	BULK	88.85	CORE	6.65
E0743	BULK	89.35	CORE	7.45
E0742	BULK	89.85	CORE	7.45
E0744	BULK	90.35	CORE	7.75
E0745	BULK	90.85	CORE	6.39
E0746	BULK	91.35	CORE	6.94
E5211	BULK	91.60	CORE	7.71
E0747	BULK	91.85	CORE	8.70
E0748	BULK	92.35	CORE	7.82

Table 6.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E5214	BULK	92.60	CORE	8.12
E0750	BULK	92.85	CORE	8.46
E0751	BULK	93.35	CORE	7.92
E0752	BULK	93.85	CORE	7.79
E0753	BULK	94.35	CORE	6.60
E0755	BULK	94.85	CORE	7.17
E5221	BULK	95.00	CORE	7.58
E0756	BULK	95.35	CORE	7.54
E0757	BULK	95.85	CORE	5.81
E0758	BULK	96.35	CORE	6.40
E0759	BULK	96.85	CORE	7.85
E0760	BULK	97.37	CORE	7.60
E5229	BULK	97.60	CORE	8.00
E5230	BULK	98.00	CORE	7.76
E0762	BULK	98.37	CORE	7.78
E5232	BULK	98.60	CORE	7.88
E0763	BULK	99.27	CORE	6.90
E5235	BULK	99.60	CORE	2.27
E5236	BULK	100.00	CORE	9.12
E0764	BULK	100.38	CORE	7.34
E5239	BULK	100.85	CORE	7.14
E5240	BULK	101.15	CORE	8.87
E0765	BULK	101.42	CORE	8.09
E0765	FOLLOW-UP	101.42	CORE	8.03
E5243	BULK	101.90	CORE	6.26
E5244	BULK	102.15	CORE	7.56
E0766	BULK	102.41	CORE	6.99
E5247	BULK	102.90	CORE	7.13
E0768	BULK	103.41	CORE	7.27
E5250	BULK	103.65	CORE	6.98
E5251	BULK	103.90	CORE	9.05
E0769	BULK	104.41	CORE	7.55
E5254	BULK	104.65	CORE	6.84
E0773	BULK	106.85	CORE	0.22
E0785	BULK	121.70	CORE	7.47
E0788	BULK	122.65	CORE	7.37
E0804	BULK	147.55	CORE	0.27
E0808	BULK	155.27	CORE	0.15
E0811	BULK	161.24	CORE	0.24
E0819	BULK	181.89	CORE	0.17
E0822	BULK	183.94	CORE	1.10
E0823	BULK	184.56	CORE	1.56
E0824	BULK	185.56	CORE	1.61

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Table III.6.3 DATA FROM CARBON ANALYSIS
(cont.)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0827	BULK	186.56	CORE	2.48
E0828	BULK	187.63	CORE	4.07
E5256	BULK	188.00	CORE	2.07
E0829	BULK	188.63	CORE	2.53
E5258	BULK	189.00	CORE	3.89
E0830	BULK	189.63	CORE	3.33

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IKU SINTEF-GRUPPEN

Table III.6.4 DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0601	BULK	25.12	CORE	0.02	0.15	1.05	0.51	29	205	0.17	0.11	423*
E0607	BULK	27.65	CORE	0.06	3.00	0.67	2.36	127	28	3.06	0.01	432*
E5006	BULK	30.00	CORE	0.01	0.00	1.87	0.26	0	719	0.01	1.00	447**
E5009	BULK	31.00	CORE	0.02	0.11	0.58	0.38	28	152	0.13	0.15	431**
E0617	BULK	32.75	CORE	0.07	2.70	0.47	1.99	135	23	2.77	0.02	431*
E0618	BULK	33.98	CORE	0.12	3.61	0.49	2.13	169	23	3.73	0.03	428
E0619	BULK	34.83	CORE	0.20	8.63	0.75	4.06	212	18	8.83	0.02	418
E5030	BULK	36.25	CORE	0.26	7.26	0.88	4.29	169	20	7.52	0.03	415**
E0622	BULK	36.29	CORE	0.10	4.86	0.43	2.51	193	17	4.96	0.02	423*
E5032	BULK	36.75	CORE	0.54	19.15	1.41	6.15	311	22	19.69	0.02	415**
E0623	BULK	36.93	CORE	0.91	27.24	0.92	7.60	358	12	28.15	0.03	409
E0624	BULK	37.43	CORE	0.28	13.73	0.55	4.09	335	13	14.01	0.01	421
E0626	BULK	37.93	CORE	0.27	14.49	0.82	4.14	350	19	14.76	0.01	418
E5036	BULK	38.15	CORE	0.32	16.73	1.46	5.04	331	28	17.05	0.01	416**
E0627	BULK	38.43	CORE	0.57	23.90	1.20	5.70	419	21	24.47	0.02	415
E5038	BULK	38.60	CORE	0.48	21.12	1.49	5.47	386	27	21.60	0.02	415
E0628	BULK	38.93	CORE	0.31	16.81	0.76	4.69	358	16	17.12	0.01	420
E5039	BULK	39.15	CORE	0.18	8.50	1.12	3.48	244	32	8.68	0.02	418
E0629	BULK	39.78	CORE	0.11	7.17	0.58	2.50	286	23	7.28	0.01	427
E5042	BULK	40.00	CORE	0.22	11.10	1.24	3.41	325	36	11.32	0.01	419
E0630	BULK	40.28	CORE	0.15	4.90	0.42	1.83	267	22	5.05	0.02	421
E5044	BULK	40.50	CORE	0.15	8.15	0.92	3.65	223	25	8.30	0.01	421
E0632	BULK	40.78	CORE	0.68	28.62	1.18	6.54	437	18	29.30	0.02	411
E0634	BULK	41.28	CORE	0.57	24.33	0.92	6.17	394	14	24.90	0.02	417
E0635	BULK	41.78	CORE	0.87	30.57	0.93	7.03	434	13	31.44	0.02	413
E5049	BULK	42.25	CORE	0.45	16.34	1.45	5.09	321	28	16.79	0.02	416
E0636	BULK	42.66	CORE	0.20	7.93	0.62	2.87	276	21	8.13	0.02	425
E0637	BULK	43.16	CORE	0.26	13.08	0.76	3.89	336	19	13.34	0.01	423
E5052	BULK	43.30	CORE	0.23	10.58	1.21	4.07	259	29	10.81	0.02	414
E0638	BULK	43.66	CORE	0.73	29.86	1.33	7.13	418	18	30.59	0.02	416
E0640	BULK	44.16	CORE	0.92	28.73	1.26	6.64	432	18	29.65	0.03	413
E0641	BULK	44.66	CORE	0.82	25.98	1.45	6.26	415	23	26.80	0.03	413
E5056	BULK	44.90	CORE	0.73	23.90	1.48	6.07	393	24	24.63	0.02	414
E5058	BULK	45.25	CORE	0.82	25.10	1.64	6.28	399	26	25.92	0.03	411**
E0642	BULK	45.46	CORE	0.69	20.77	0.96	5.27	394	18	21.46	0.03	415
E0643	BULK	46.16	CORE	0.90	27.24	1.16	6.84	398	16	28.14	0.03	414
E0644	BULK	46.66	CORE	0.96	28.10	1.49	8.10	346	18	29.06	0.03	410
E0645	BULK	47.16	CORE	1.05	26.81	1.26	6.94	386	18	27.86	0.03	405
E0646	BULK	47.56	CORE	0.84	22.21	1.25	6.33	350	19	23.05	0.03	406
E5065	BULK	47.75	CORE	0.87	18.75	1.32	6.13	305	21	19.62	0.04	404**
E0648	BULK	48.06	CORE	0.76	21.46	1.05	5.83	368	18	22.22	0.03	413
E5066	BULK	48.25	CORE	0.77	17.05	1.42	5.68	300	25	17.82	0.04	405**
E0656	BULK	48.46	CORE	0.65	20.20	1.18	5.69	355	20	20.85	0.03	413
E0649	BULK	48.96	CORE	0.90	24.92	0.91	6.54	381	13	25.82	0.03	411
E5069	BULK	49.25	CORE	0.72	17.28	1.49	5.88	293	25	18.00	0.04	408**

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

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IKU SINTEF-GRUPPEN

Table 6.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0650	BULK	49.46	CORE	0.82	22.00	0.86	5.82	378	14	22.82	0.03	412
E0651	BULK	49.96	CORE	0.86	25.18	1.09	6.56	383	16	26.04	0.03	411
E0652	BULK	50.18	CORE	0.83	22.55	0.98	5.70	395	17	23.38	0.03	409
E5074	BULK	50.30	CORE	0.78	19.82	1.40	5.99	330	23	20.60	0.03	408**
E0657	BULK	50.69	CORE	0.52	17.98	1.02	6.60	272	15	18.50	0.02	414
E5075	BULK	50.90	CORE	0.71	18.63	1.62	5.82	320	27	19.34	0.03	408**
E0658	BULK	51.19	CORE	0.71	28.62	1.20	6.79	421	17	29.33	0.02	414
E5077	BULK	51.30	CORE	0.69	18.46	1.57	5.87	314	26	19.15	0.03	410
E0659	BULK	51.69	CORE	0.64	19.45	1.20	5.32	365	22	20.09	0.03	416
E0660	BULK	52.19	CORE	0.73	20.00	0.94	6.10	327	15	20.73	0.03	410
E0661	BULK	52.69	CORE	0.55	23.24	1.03	6.46	359	15	23.79	0.02	418
E0662	BULK	53.19	CORE	0.67	18.91	0.78	5.21	362	14	19.58	0.03	413
E0663	BULK	53.21	CORE	0.65	20.89	1.11	5.48	381	20	21.54	0.03	416
E5082	BULK	53.50	CORE	0.68	18.86	1.45	5.82	324	24	19.54	0.03	411
E0667	BULK	54.21	CORE	0.67	20.06	0.94	5.27	380	17	20.73	0.03	415
E0668	BULK	54.71	CORE	0.60	20.92	0.90	5.75	363	15	21.52	0.02	412
E0669	BULK	55.21	CORE	0.74	23.49	0.95	6.03	389	15	24.23	0.03	413
E0670	BULK	55.71	CORE	0.39	15.79	1.04	4.40	358	23	16.18	0.02	413
E0672	BULK	56.38	CORE	0.83	24.09	0.86	6.28	383	13	24.92	0.03	413
E0673	BULK	56.79	CORE	0.72	23.11	0.99	6.05	381	16	23.83	0.03	415
E0674	BULK	57.29	CORE	0.86	24.42	0.92	6.44	379	14	25.28	0.03	412
E0675	BULK	57.79	CORE	0.69	17.29	0.85	5.37	321	15	17.98	0.03	411
E0676	BULK	58.29	CORE	0.87	25.03	1.00	6.58	380	15	25.90	0.03	410
E0677	BULK	58.79	CORE	0.82	20.02	0.96	5.53	362	17	20.84	0.03	409
E5102	BULK	59.25	CORE	0.63	15.86	1.33	5.25	302	25	16.49	0.03	411
E0679	BULK	59.79	CORE	0.97	24.30	1.09	7.17	338	15	25.27	0.03	405
E5106	BULK	60.25	CORE	1.00	21.21	1.47	6.33	335	23	22.21	0.04	406**
E5107	BULK	60.50	CORE	0.89	23.04	1.64	6.42	358	25	23.93	0.03	409
E0684	BULK	60.79	CORE	0.97	27.64	1.00	6.60	418	15	28.61	0.03	411
E5110	BULK	61.25	CORE	0.91	22.08	1.52	6.49	340	23	22.99	0.03	409**
E0685	BULK	61.65	CORE	0.90	28.09	1.07	7.18	391	14	28.99	0.03	412
E5111	BULK	61.90	CORE	0.97	24.02	1.16	6.72	357	17	24.99	0.03	410
E0686	BULK	62.15	CORE	0.94	27.61	1.15	6.80	406	16	28.55	0.03	413
E0687	BULK	62.65	CORE	1.33	29.90	1.30	7.26	411	17	31.23	0.04	411
E0688	BULK	63.15	CORE	1.26	30.14	1.49	7.55	399	19	31.40	0.04	409**
E5115	BULK	63.40	CORE	1.43	27.31	1.61	7.81	349	20	28.74	0.04	406
E0689	BULK	63.65	CORE	1.53	35.68	1.66	8.35	427	19	37.21	0.04	410
E0690	BULK	64.15	CORE	0.85	22.55	1.74	5.96	378	29	23.40	0.03	407
E0691	BULK	64.65	CORE	0.62	19.31	1.71	5.42	356	31	19.93	0.03	410**
E5121	BULK	65.15	CORE	0.58	14.62	1.39	6.54	223	21	15.20	0.03	408**
E0693	BULK	65.40	CORE	0.82	21.45	1.74	5.76	372	30	22.27	0.03	409
E0694	BULK	65.90	CORE	0.97	25.20	1.84	6.52	386	28	26.17	0.03	407**
E5123	BULK	66.15	CORE	1.05	21.20	1.61	6.54	324	24	22.25	0.04	407**
E0695	BULK	66.40	CORE	0.93	26.18	1.92	6.66	393	28	27.11	0.03	409**
E0696	BULK	66.90	CORE	1.04	26.00	1.87	6.48	401	28	27.04	0.03	406

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

Project no.: 21343424
Location : 6307/07-U-02
Date : 88.10.28

IKU SINTEF-GRUPPEN

Table 6.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0697	BULK	67.05	CORE	1.18	24.01	0.96	6.39	375	15	25.19	0.04	406
E5128	BULK	67.40	CORE	1.07	24.59	1.79	6.45	381	27	25.66	0.04	409
E5130	BULK	67.90	CORE	1.05	23.40	1.78	6.84	342	26	24.45	0.04	410
E5132	BULK	68.15	CORE	1.36	28.91	1.66	7.38	391	22	30.27	0.04	409
E5134	BULK	68.65	CORE	0.84	20.52	1.64	6.15	333	26	21.36	0.03	404**
E5137	BULK	69.15	CORE	1.37	26.39	2.33	8.03	328	29	27.76	0.04	405
E5139	BULK	69.65	CORE	1.43	22.25	2.42	6.78	328	35	23.68	0.06	404**
E5142	BULK	70.15	CORE	1.34	31.55	1.70	7.61	414	22	32.89	0.04	408
E0700	BULK	70.75	CORE	1.57	40.96	2.00	9.24	443	21	42.53	0.03	405
E0701	BULK	71.23	CORE	1.01	26.13	1.46	6.46	404	22	27.14	0.03	408
E0705	BULK	71.73	CORE	1.27	33.25	1.55	7.54	440	20	34.52	0.03	408
E0706	BULK	71.98	CORE	1.36	31.95	1.44	7.66	417	18	33.31	0.04	408
E0707	BULK	72.25	CORE	1.60	38.00	1.56	8.37	454	18	39.60	0.04	409
E0708	BULK	72.71	CORE	1.24	34.69	1.48	7.94	436	18	35.93	0.03	409
E0710	BULK	73.21	CORE	1.00	29.61	1.59	6.95	426	22	30.61	0.03	409
E5153	BULK	74.00	CORE	0.97	22.79	1.77	7.00	325	25	23.76	0.04	404
E0711	BULK	74.21	CORE	1.06	31.80	1.77	7.92	401	22	32.86	0.03	410
E0712	BULK	74.71	CORE	0.99	27.52	1.44	7.16	384	20	28.51	0.03	409
E0713	BULK	75.21	CORE	1.13	31.41	1.46	7.24	433	20	32.54	0.03	410
E0714	BULK	75.71	CORE	0.89	31.89	1.77	7.04	452	25	32.78	0.02	411
E0721	BULK	76.22	CORE	1.03	29.34	1.51	6.73	435	22	30.37	0.03	409
E5162	BULK	77.00	CORE	1.41	28.37	1.84	7.86	360	23	29.78	0.04	402
E0723	BULK	77.22	CORE	1.16	30.48	1.49	7.78	391	19	31.64	0.03	413
E5165	BULK	77.75	CORE	0.39	18.62	1.83	4.92	378	37	19.01	0.02	413
E0724	BULK	78.22	CORE	0.98	28.72	1.49	6.84	419	21	29.70	0.03	410
E5169	BULK	78.75	CORE	0.68	21.29	1.69	6.27	339	26	21.97	0.03	410
E0717	BULK	79.37	CORE	0.25	16.72	1.78	4.04	413	44	16.97	0.01	416
E5172	BULK	79.60	CORE	1.20	28.94	1.81	7.43	389	24	30.14	0.03	408
E0718	BULK	80.07	CORE	1.07	33.42	1.37	7.32	456	18	34.49	0.03	410
E5174	BULK	80.50	CORE	1.66	30.44	1.75	8.46	359	20	32.10	0.05	404
E5176	BULK	81.00	CORE	1.59	28.11	1.65	8.02	350	20	29.70	0.05	404
E0720	BULK	81.27	CORE	1.21	32.08	1.60	7.24	443	22	33.29	0.03	411
E5179	BULK	81.50	CORE	1.61	30.24	1.71	8.33	363	20	31.85	0.05	405
E5180	BULK	82.00	CORE	1.63	31.00	1.42	8.30	373	17	32.63	0.04	408
E0725	BULK	82.19	CORE	1.51	36.31	1.60	8.07	449	19	37.82	0.03	409
E0726	BULK	82.69	CORE	1.35	31.93	1.36	7.71	414	17	33.28	0.04	409
E0727	BULK	83.19	CORE	1.57	35.48	1.22	7.80	454	15	37.05	0.04	410
E0729	BULK	83.69	CORE	0.81	28.84	1.29	6.44	447	20	29.65	0.02	413
E0730	BULK	84.19	CORE	0.69	23.24	1.49	6.36	365	23	23.93	0.02	410
E5189	BULK	84.50	CORE	0.66	21.64	1.62	6.79	318	23	22.30	0.02	408
E0731	BULK	84.69	CORE	0.63	20.19	1.45	5.25	384	27	20.82	0.03	411
E5190	BULK	85.00	CORE	1.03	18.98	1.54	6.28	302	24	20.01	0.05	404**
E0732	BULK	85.34	CORE	0.88	22.60	1.43	6.40	353	22	23.48	0.03	408
E5192	BULK	85.60	CORE	1.30	21.86	1.51	7.17	304	21	23.16	0.05	404**
E0734	BULK	85.84	CORE	1.35	29.69	1.22	7.29	407	16	31.04	0.04	405

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

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Table 6.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH	SAMPLE TYPE	S1	S2	S3	TOC	HYDR. INDEX	OXYG. INDEX	PETR. POTEN.	PROD. INDEX S1/(S1+S2)	Tmax
		(m)		(mg/g rock)			(%)	(mg/g TOC)		S1+S2		(°C)
E0735	BULK	86.34	CORE	1.42	30.19	1.38	7.48	403	18	31.61	0.04	405**
E0737	BULK	86.84	CORE	1.50	30.26	1.54	7.58	399	20	31.76	0.04	403**
E0738	BULK	87.34	CORE	1.17	26.86	1.32	6.30	426	20	28.03	0.04	405**
E0739	BULK	87.84	CORE	0.97	27.18	1.40	6.53	416	21	28.15	0.03	407
E5200	BULK	88.00	CORE	1.07	20.15	1.53	6.20	325	24	21.22	0.05	403**
E0740	BULK	88.35	CORE	0.85	19.45	1.16	5.38	361	21	20.30	0.04	405
E0741	BULK	88.85	CORE	0.96	24.82	1.65	6.65	373	24	25.78	0.03	403
E0743	BULK	89.35	CORE	1.04	27.27	1.95	7.45	366	26	28.31	0.03	403
E0742	BULK	89.85	CORE	1.34	27.74	1.78	7.45	372	23	29.08	0.04	397
E0744	BULK	90.35	CORE	1.16	28.30	2.23	7.75	365	28	29.46	0.03	404
E0745	BULK	90.85	CORE	0.82	16.72	2.05	6.39	261	32	17.54	0.04	399**
E0746	BULK	91.35	CORE	0.88	22.58	2.06	6.94	325	29	23.46	0.03	404
E5211	BULK	91.60	CORE	1.43	23.13	1.49	7.71	300	19	24.56	0.05	402
E0747	BULK	91.85	CORE	1.74	35.11	2.13	8.70	403	24	36.85	0.04	402
E0748	BULK	92.35	CORE	1.08	30.78	1.94	7.82	393	24	31.86	0.03	406**
E5214	BULK	92.60	CORE	1.43	30.74	1.62	8.12	378	19	32.17	0.04	407
E0750	BULK	92.85	CORE	1.54	34.57	1.53	8.46	408	18	36.11	0.04	404**
E0751	BULK	93.35	CORE	1.44	31.09	1.64	7.92	392	20	32.53	0.04	403
E0752	BULK	93.85	CORE	1.39	33.13	1.77	7.79	425	22	34.52	0.04	407**
E0753	BULK	94.35	CORE	1.07	25.53	1.46	6.60	386	22	26.60	0.04	408**
E0755	BULK	94.85	CORE	1.08	28.32	1.60	7.17	394	22	29.40	0.03	407**
E5221	BULK	95.00	CORE	1.12	28.10	1.54	7.58	370	20	29.22	0.03	404
E0756	BULK	95.35	CORE	1.48	31.75	1.70	7.54	421	22	33.23	0.04	403
E0757	BULK	95.85	CORE	0.82	22.95	1.43	5.81	395	24	23.77	0.03	406**
E0758	BULK	96.35	CORE	0.91	26.60	1.55	6.40	415	24	27.51	0.03	410
E0759	BULK	96.85	CORE	1.17	34.84	1.65	7.85	443	21	36.01	0.03	406
E0760	BULK	97.37	CORE	1.19	34.05	1.25	7.60	448	16	35.24	0.03	408
E5229	BULK	97.60	CORE	1.10	30.65	1.65	8.00	383	20	31.75	0.03	403
E5230	BULK	98.00	CORE	1.16	26.69	1.66	7.76	343	21	27.85	0.04	402
E0762	BULK	98.37	CORE	1.37	30.06	1.54	7.78	386	19	31.43	0.04	403
E5232	BULK	98.60	CORE	1.01	28.82	1.37	7.88	365	17	29.83	0.03	404
E0763	BULK	99.27	CORE	0.91	26.48	1.32	6.90	383	19	27.39	0.03	406
E5235	BULK	99.60	CORE	0.21	6.92	1.66	2.27	304	73	7.13	0.02	413
E5236	BULK	100.00	CORE	1.95	34.79	1.66	9.12	381	18	36.74	0.05	403
E0764	BULK	100.38	CORE	1.23	28.01	1.17	7.34	381	15	29.24	0.04	403
E5239	BULK	100.85	CORE	1.40	24.35	1.46	7.14	341	20	25.75	0.05	400**
E5240	BULK	101.15	CORE	1.63	29.90	1.47	8.87	337	16	31.53	0.05	402
E0765	BULK	101.42	CORE	1.60	36.43	1.08	8.09	450	13	38.03	0.04	405
E5243	BULK	101.90	CORE	1.14	19.40	1.19	6.26	309	19	20.54	0.05	403
E5244	BULK	102.15	CORE	0.65	24.52	1.65	7.56	324	21	25.17	0.02	404
E0766	BULK	102.41	CORE	0.96	26.63	0.98	6.99	380	14	27.59	0.03	407
E5247	BULK	102.90	CORE	1.18	25.07	1.55	7.13	351	21	26.25	0.04	402**
E0768	BULK	103.41	CORE	1.03	26.27	1.36	7.27	361	18	27.30	0.03	403
E5250	BULK	103.65	CORE	1.24	23.06	1.52	6.98	330	21	24.30	0.05	401**
E5251	BULK	103.90	CORE	1.60	25.93	1.08	9.05	286	11	27.53	0.05	401**

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

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Table III.6.4 (cont.) DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0769	BULK	104.41	CORE	1.05	30.22	1.29	7.55	400	17	31.27	0.03	405
E5254	BULK	104.65	CORE	1.05	21.15	1.03	6.84	309	15	22.20	0.04	402**
E0785	BULK	121.70	CORE	0.59	23.88	1.78	7.47	319	23	24.47	0.02	404
E0788	BULK	122.65	CORE	0.73	25.68	1.73	7.37	348	23	26.41	0.02	402**
E0804	BULK	147.55	CORE	0.01	0.01	0.99	0.27	3	366	0.02	0.50	350**
E0808	BULK	155.27	CORE	0.03	0.11	0.02	0.15	73	13	0.14	0.21	500**
E0811	BULK	161.24	CORE	0.01	0.03	0.18	0.24	12	75	0.04	0.25	400**
E0819	BULK	181.89	CORE	0.00	0.01	0.02	0.17	5	11	0.01	0.00	400**
E0822	BULK	183.94	CORE	0.01	0.42	0.41	1.10	38	37	0.43	0.02	420*
E0823	BULK	184.56	CORE	0.02	0.74	0.38	1.56	47	24	0.76	0.02	427*
E0824	BULK	185.56	CORE	0.03	1.12	0.43	1.61	69	26	1.15	0.02	429*
E0827	BULK	186.56	CORE	0.06	2.36	0.42	2.48	95	16	2.42	0.02	427*
E0828	BULK	187.63	CORE	0.10	7.06	0.56	4.07	173	13	7.16	0.01	425*
E5256	BULK	188.00	CORE	0.05	1.95	0.67	2.07	94	32	2.00	0.02	426*
E0829	BULK	188.63	CORE	0.06	3.39	0.55	2.53	133	21	3.45	0.01	424*
E5258	BULK	189.00	CORE	0.12	4.64	0.79	3.89	119	20	4.76	0.02	422
E0830	BULK	189.63	CORE	0.12	5.38	0.44	3.33	161	13	5.50	0.02	425

* Low S1 and/or S2 peak. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

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Table III.6.5a WEIGHT OF CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ROCK EXTR. (g)	EOM (mg)	ASPH (mg)	SAT HC (mg)	ARO HC (mg)	POLAR COMP. (mg)	HC (mg)	NONHC (mg)	TOC (%)
E0619	EOM	34.83	CORE	67.4	44.0	20.6	2.1	4.2	12.1	6.3	37.7	1.34
E0630	EOM	40.28	CORE	55.3	114.4	68.8	3.7	11.8	22.9	15.5	98.9	3.11
E0632	EOM	40.78	CORE	63.8	156.0	31.5	10.5	26.2	49.3	36.7	119.3	6.97
E0640	EOM	44.16	CORE	54.9	131.4	38.5	5.5	19.8	39.3	25.3	106.1	6.58
E0646	EOM	47.56	CORE	55.7	131.0	26.5	11.0	17.7	37.7	28.7	102.3	6.23
E0684	EOM	60.79	CORE	80.4	199.5	58.6	19.7	21.8	58.2	41.5	158.0	6.25
E0707	EOM	72.25	CORE	78.3	283.4	75.6	16.0	33.2	84.4	49.2	234.2	8.38
E0718	EOM	80.07	CORE	80.3	282.2	93.1	16.6	34.8	49.9	51.4	230.8	7.58
E0765	EOM	101.42	CORE	78.9	512.7	331.9	11.2	30.9	81.2	42.1	470.6	8.03

Table III.6.5b

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm of rock)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0619	EOM	34.83	CORE	653	306	31	62	180	93	560
E0630	EOM	40.28	CORE	2069	1245	68	214	414	282	1787
E0632	EOM	40.78	CORE	2446	494	165	411	773	576	1870
E0640	EOM	44.16	CORE	2394	701	101	361	716	462	1932
E0646	EOM	47.56	CORE	2353	476	198	317	678	515	1838
E0684	EOM	60.79	CORE	2480	728	245	270	724	515	1965
E0707	EOM	72.25	CORE	3621	966	204	424	1079	628	2993
E0718	EOM	80.07	CORE	3515	1160	207	433	622	640	2875
E0765	EOM	101.42	CORE	6495	4204	142	391	1029	533	5962

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Table III.6.5c

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0619	EOM	34.83	CORE	48.7	22.8	2.3	4.6	13.4	6.9	41.8
E0630	EOM	40.28	CORE	66.5	40.0	2.2	6.9	13.3	9.1	57.4
E0632	EOM	40.78	CORE	35.1	7.1	2.4	5.9	11.1	8.3	26.8
E0640	EOM	44.16	CORE	36.4	10.7	1.5	5.5	10.9	7.0	29.4
E0646	EOM	47.56	CORE	37.8	7.6	3.2	5.1	10.9	8.3	29.5
E0684	EOM	60.79	CORE	39.7	11.7	3.9	4.3	11.6	8.2	31.5
E0707	EOM	72.25	CORE	43.2	11.5	2.4	5.1	12.9	7.5	35.7
E0718	EOM	80.07	CORE	46.4	15.3	2.7	5.7	8.2	8.4	38.0
E0765	EOM	101.42	CORE	80.9	52.4	1.8	4.9	12.8	6.7	74.2

Table III.6.5d

COMPOSITION OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ASPH / EOM (%)	SAT / EOM (%)	ARO / EOM (%)	HC / EOM (%)	POLAR / EOM (%)	SAT / ARO x 100	HC / NONHC x 100
E0619	EOM	34.83	CORE	46.8	4.7	9.4	14.1	27.5	50.0	16.5
E0630	EOM	40.28	CORE	60.1	3.3	10.3	13.6	20.0	31.6	15.7
E0632	EOM	40.78	CORE	20.2	6.7	16.8	23.5	31.6	40.0	30.8
E0640	EOM	44.16	CORE	29.3	4.2	15.1	19.3	29.9	27.9	23.9
E0646	EOM	47.56	CORE	20.2	8.4	13.5	21.9	28.8	62.5	28.0
E0684	EOM	60.79	CORE	29.4	9.9	10.9	20.8	29.2	90.5	26.2
E0707	EOM	72.25	CORE	26.7	5.6	11.7	17.3	29.8	48.1	21.0
E0718	EOM	80.07	CORE	33.0	5.9	12.3	18.2	17.7	47.8	22.3
E0765	EOM	101.42	CORE	64.7	2.2	6.0	8.2	15.8	36.2	8.9

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Table III.6.6a TABULATION OF DATA FROM GAS CHROMATOGRAMS OF TOTAL SATURATES AND N-ALKANES

IKUNO	FRAC NAME	DEPTH (m)	Pri* / Phy	Pri* A=----- n-C17	Phy* B=----- n-C18	A* / B	n-C17 / n-C27	n-C31 / n-C19	CPI 1	CPI 2
E0619	SAT	34.83	1.5	1.9	1.5	1.2	0.4	1.3	2.3	2.5 1)
E0630	SAT	40.28	1.3	1.8	2.2	0.8	0.5	1.1	1.8	1.9
E0632	SAT	40.78	0.8	2.0	3.7	0.5	0.8	0.7	2.3	2.6 1)
E0640	SAT	44.16	0.9	2.1	3.7	0.6	0.9	0.9	1.5	1.5 2)
E0646	SAT	47.56	0.7	2.5	4.4	0.6	0.6	0.9	1.6	1.7 1)
E0684	SAT	60.79	0.7	2.4	4.4	0.5	0.8	0.0	1.1	1.6 2)
E0707	SAT	72.25	0.7	2.7	5.5	0.5	0.7	0.9	1.3	1.4 2)
E0718	SAT	80.07	0.6	1.9	5.5	0.3	0.8	1.0	1.8	1.9 1)
E0765	SAT	101.42	0.5	3.1	5.9	0.5	0.7	1.6	1.4	1.3 1)

* Ratios calculated from peak areas.

1) CPI, n-C17/n-C27 and n-C31/n-C19 determined from gas chromatograms of n-alkanes
2) CPI values, particularly CPI-2, affected by n-C26 that coelutes with unknown compound.

Table III.6.6b TABULATION OF DATA FROM GAS CHROMATOGRAMS OF TOTAL SATURATES Peak heights.

IKUNO	FRAC NAME	DEPTH (m)	Pri / Phy	Pri A=----- n-C17	Phy B=----- n-C18	A / B
E0619	SAT	34.83	1.6	1.5	1.3	1.2
E0630	SAT	40.28	1.2	1.5	1.9	0.8
E0632	SAT	40.78	0.8	1.8	3.4	0.5
E0640	SAT	44.16	0.9	1.8	3.4	0.5
E0646	SAT	47.56	0.8	2.2	3.8	0.6
E0684	SAT	60.79	0.8	2.0	3.8	0.5
E0707	SAT	72.25	0.8	2.3	4.6	0.5
E0718	SAT	80.07	0.7	1.6	4.5	0.4
E0765	SAT	101.42	0.6	2.7	4.5	0.6

Table III.6.7a *Molecular ratios from peak heights in mass chromatograms. Hopenes/hopanes m/z 191. Branched/cycloalkane fractions in extracts. Core 6307/07-U-02*

Sample no.	Depth (m)	C_{27}-17β/17α[1]	C_{27}-18α/17α[2] (Tm/Ts)	αβ/αβ+ββ[3]	ββ/αβ+ββ[4]	$C_{30:1}/C_{30}$-αβ[5]	tri/C_{27}-17β[6]	C_{27}-17β/C_{30}-ββ/		C_{31}-ββ[7]
E-619	34.83	2.11	0.32	43.4	56.6	1.61	0.45	32.8	35.2	32.0
E-632	40.78	1.65	0.61	52.2	47.8	1.66	0.82	32.5	36.8	30.7
E-646	47.56	1.95	0.45	48.7	51.3	2.11	1.15	34.2	35.1	30.7
E-718	80.07	2.05	0.60	50.0	50.0	1.60	0.59	39.0	38.1	22.9
E-765	101.42	1.38	0.21	74.0	26.0	0.71	0.30	48.5	34.0	17.5

1 Peak 4/3
2 Peak 2/3
3 Peak 8/8+12 (in %), C_{30}-isomers
4 Peak 12/8+12 (in %)
5 Peak 9/8
6 Peak 3 total m/z 191/peak 4 in hopane range m/z 191
7 % distribution of peaks 4/12/13

IKU SINTEF-GRUPPEN

Table III.6.7b *Molecular ratios from peak heights in mass chromatograms. Sterenes/steranes m/z 217, 257. Branched/cycloalkane fractions in extracts. Core 6307/07-U-02*

Sample no.	Depth (m)	C_{29}-sterane isomers[1]	%C_{27}	/ C_{28}	/ C_{29}[2]	Rearr.sterenes/steranes[3]	Rearr. sterenesII/steranes[4]	C_{21}/C_{29}[5]
E-619	34.83	24.8	36.5	17.7	45.7	8.6	5.8	0.40
E-632	40.78	26.9	35.9	24.0	40.1	10.1	5.0	0.34
E-646	47.56	35.5	37.5	23.5	39.0	14.5	7.8	0.87
E-718	80.07	28.7	36.0	25.7	38.3	5.7	4.7	0.57
E-765	101.42	23.0	36.6	25.2	38.2	3.0	1.3	0.18

1 Peak 6/6+7, %(βαα/βαα+ααα)
2 % distribution of peaks 3/5/7
3 Intensity in m/z 257/m/z 217
4 Intensity in m/z 271/m/z 217
5 Peaks 2/9+10 in m/z 217

IKU SINTEF-GRUPPEN

Table III.6.8a *Molecular ratios from PY-GC-MS chromatograms of kerogens. Branched compounds and aromatics. All ratios are calculated from peak heights.*

	Depth (m)	HI	$\frac{C_{11}-C_{17}\ alkene}{alkane}$ [1]	$\frac{1\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{(1+2)\text{-pristene}}{nC_{17}(ene+ane)}$ [1]	$\frac{alkadiene}{n\text{-decene}}$ [2]
Core 63007/07-U-02						
E-619	34.83	212	-	-	-	~0
E-646	47.56	350	1.40	1.31	1.77	~0
E-718	80.07	456	1.25	0.66	0.75	~0
E-765	101.42	450	1.15	0.85	0.95	~0

1) Measured from the total ion chromatograms (TICs)

2) Alkadienes from m/z 95, n-decene from m/z 97. $nC_{12}+nC_{15}+nC_{17}$ alkadienes are used here.

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Table III.6.8a cont.

	Depth (m)	HI	(m+p)-xylene [1] / n-decene	o-xylene [1] / n-decene	$\Sigma_{i=15}^{20} C_i B$ [2] / $C_{15}B$	(1+2) MN [3] / n-heptadecane	MP [4] / n-decene	MDBT [5] / n-tetradecane
Core 6307/07-U-02								
E-619	34.83	212	3.8	2.6	-	>20	0.29	0.82
E-646	47.56	350	7.7	4.6	0.34	>20	0.37	1.57
E-718	80.07	456	4.7	2.4	0.35	>0.20	0.35	1.51
E-765	101.42	450	2.9	1.6	0.37	>20	0.45	2.29

1) Xylenes from m/z 106, n-decene from m/z 97.

2) Alkylbenzenes from m/z 105. The most intense isomers is used for each C-number.

3) Methylnaphthalenes (MN) and n-heptadecane from m/z 141.

4) Methylphenanthrenes from m/z 192, n-decene from m/z 97. The sum of 3-MP, 2-MP, 9-MP and 1-MP is used.

5) Methyldibenzothiophenes (MDBT) from m/z 198, n-decene from m/z 97.

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Table III.6.8a cont. All ratios are calculated from peak areas.

IKU no.	Depth (m)	HI	(m+p)-xylene / n-decene	o-xylene / n-decene	phenol / n-decene	meth.phenol / n-decene	2-meth.phenol / 1-meth.phenol
Core 6307/07-U-02							
E-619	34.83	212	5.0	3.0	21.7	14.3	0.34
E-646	47.56	350	8.6	4.1	12.6	15.6	0.38
E-718	80.07	456	7.2	3.8	6.3	12.4	0.40
E-765	101.42	450	7.5	3.6	9.6	13.2	0.40

Xylenes from m/z 106, n-decene from m/z 97, phenol from m/z 94, methylphenols from m/z 108.

SDMT/rapport/AE2/21.3434.28/ame/6/28-DEC-88

Table III.6.8b *Molecular ratios from triterpane mass chromatograms (m/z 191). Calculated from peak areas (E-619 from measured peak heights).*
PY-GC-MS of kerogens
Core 6307/07-U-02

						% distribution		
Sample no.	Depth	C_{27}-17β/17α[1)]	C_{27}-18α/17α[2)]	$C_{27:1}/C_{27:0}$-17β[3)]	$C_{29:1}/C_{29:0}$[4)]	$C_{27:0}$-17β	$C_{29:0}$	$C_{30:0}$
E-619	34.83	-	-	-	0.1	12.4	43.8	43.8
E-646	47.56	3.5	0.44	2.2	1.8	30.7	38.0	31.8
E-718	80.07	2.6	0.31	3.3	1.6	18.2	35.5	46.2
E-765	101.42	0.8	0.25	4.7	2.3	23.2	40.6	36.2

1) Peaks 4/3
2) Peaks 2/3
3) Peaks 3a/4
4) Peaks 5/7
5) % distribution of peaks 4, 7 and 10

IKU SINTEF-GRUPPEN

VISUAL KEROGEN ANALYSIS

TABLE NO.: III.6.9
WELL NO.: 6307/07-U-02

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
E-619	34.83m	Am:80-85% Lm:5-10% W :5% C :5%	F-M-L	Good-Fair	NEWTAI 2.0-3.0	Organic residue dominated by amorphous matter, both finely dispersed and larger aggregates / degraded clasts. Only about 5% of the amorphogen shows strong yellow colouration in UV-light, whereas 5-10% shows a redbrown colouration which indicates that little of the amorphous matter is of algal and/or liptinitic origin. The amorphogen is frequently specked with pyrite and small dark brown woody/coaly fragments.

ABBREVIATIONS:

Am = Amorphous
Al = Algae
W = Woody material
C = Coaly fragments
Lm = Liptinitic material

F = Fine
M = Medium
L = Large

* see experimental

IKU SINTEF-GRUPPEN

VISUAL KEROGEN ANALYSIS

TABLE NO.: III.6.9
WELL NO.: 6307/07-U-02

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
E-627	38.43 m	Am:85-90% Lm:<5% W : 5% C :<5%	F-M-L	Fair	2.0-3.0	Comparable to sample E619, but with a increased proportion of material showing yellow fluorescence in UV-light.
E-630	40.28 m	Am:75-80% Lm: 5-10% W : 10-15% C :	F-M-L	Good	2.0-3.0	Comparable to sample E619, but containing a relatively larger proportion of brown to black woody/coaly fragments.
E-632	40.78 m	Am:85-90% Al:<5% Lm:<5% W : 5% C :<5%	F-M-L	Good	2.0-3.0	Comparable to sample E627. Tasmanitids and other prasinophycean algae present.

ABBREVIATIONS:

Am = Amorphous
Al = Algae
W = Woody material
C = Coaly fragments
Lm = Liptinitic material

F = Fine
M = Medium
L = Large

* see experimental

IKU SINTEF-GRUPPEN

VISUAL KEROGEN ANALYSIS

TABLE NO.: III.6.9
WELL NO.: 6307/07-U-02

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
E-640	44.16 m	Am:85-90% Al:<5% Lm:<5% W : 5% C : 5%	F-M-L	Good	2.0-3.0	Comparable to sample E-632
E-646	47.56 m	Am:85-90% Lm:<5% W : 5% C : 5%	F-M-L	Fair-Good	2.0-3.0	Comparable to sample E-627
E-718	80.07 m	Am:85-90% Lm:<5% W : 5% C : 5%	F-M-L	Fair	2.0-3.0	Comparable to samples E-632 and E-640
E-765	101.42 m	Am:85-90% Lm:<5% W : 5% C : 5%	F-M-L	Good-Fair	2.0-3.0	-"-

ABBREVIATIONS:

Am = Amorphous
Al = Algae
W = Woody material
C = Coaly fragments
Lm = Liptinitic material

F = Fine
M = Medium
L = Large

* see experimental

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Table III.6.10 *Core 6307/07-U-02. Isotope analyses of kerogens. $\delta^{13}C$ and δD*

IKU no.	Depth	$\delta^{13}C$ (o/oo PDB)	δD (o/oo SMOW)
E-632	40.78	-29.2	
E-646	47.56	-30.6	-136
E-718	80.07	-31.1	-138
E-765	101.42	-29.1	-132
NBS 22:		-29.77±0.06	

IKU SINTEF-GRUPPEN

FIGURES

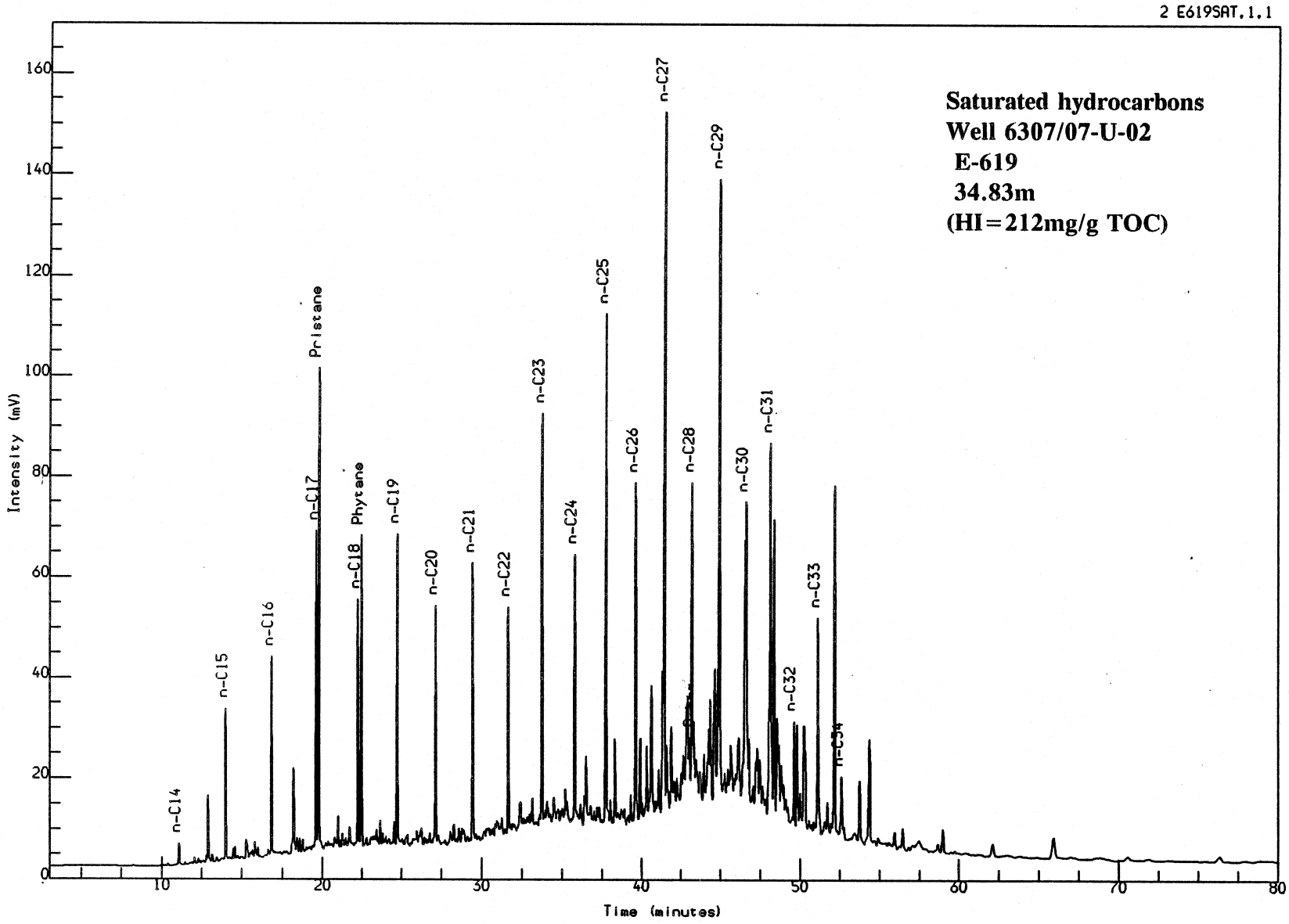
IKU SINTEF-GRUPPEN

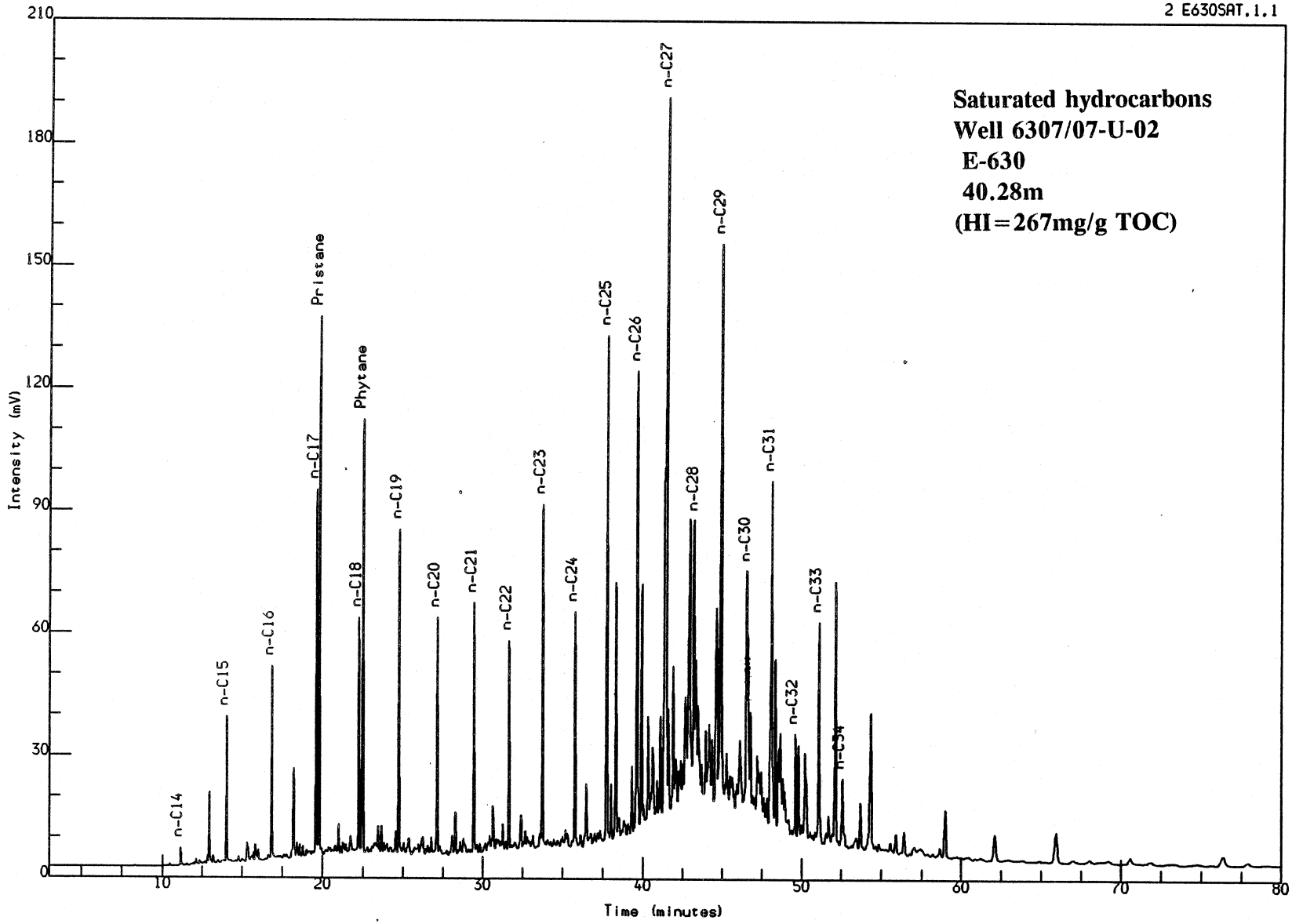
Figure III.6.1

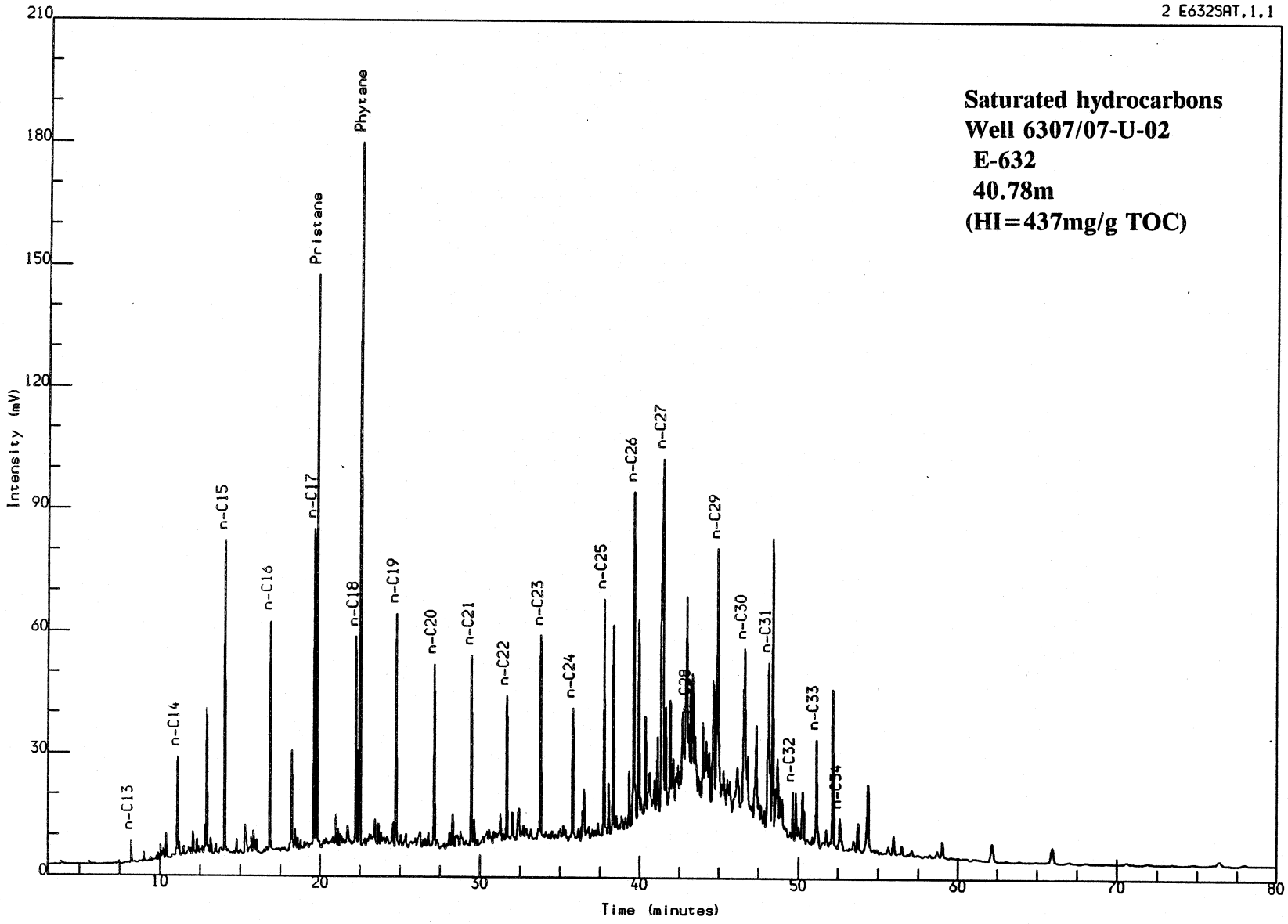
Gas chromatograms

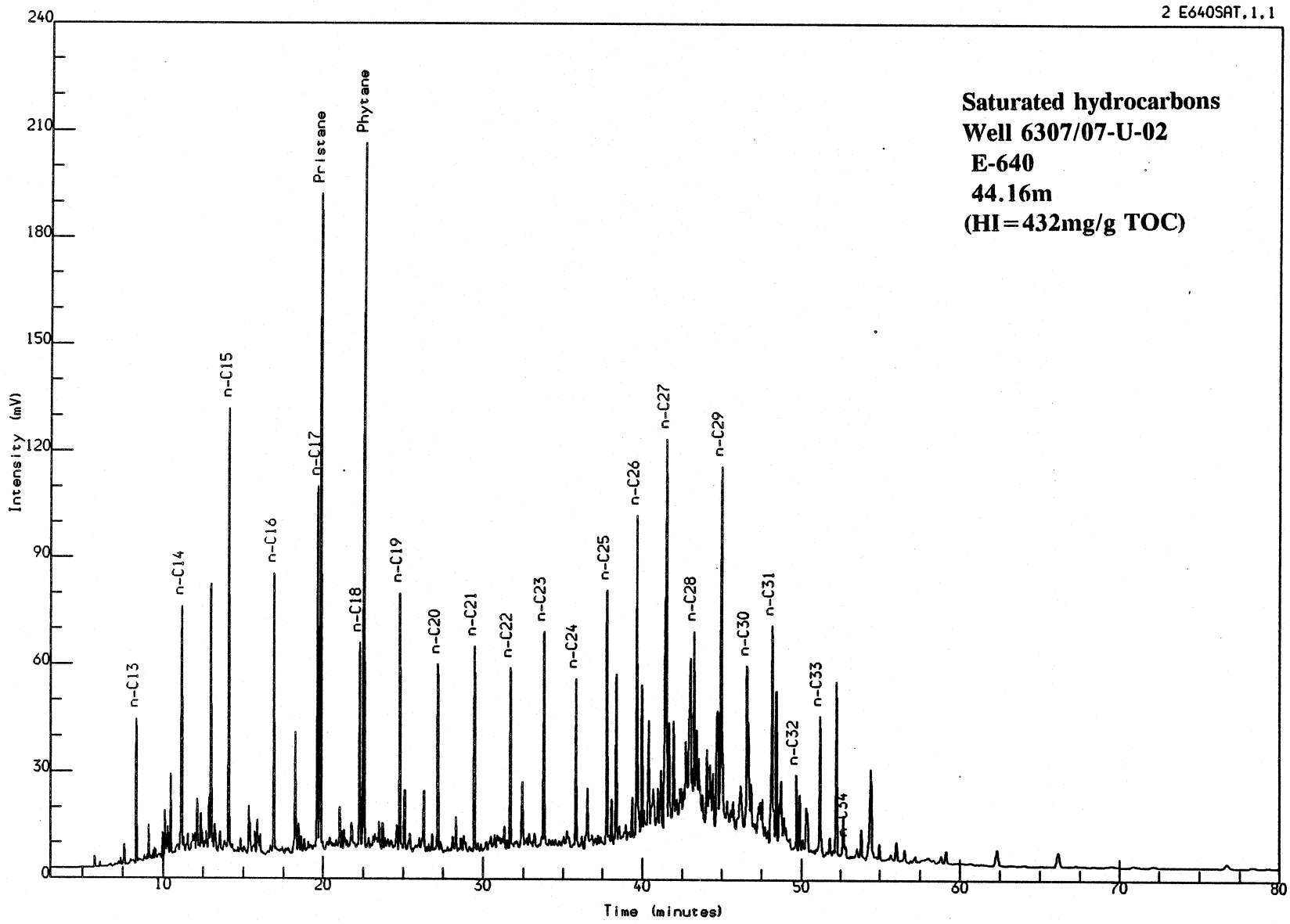
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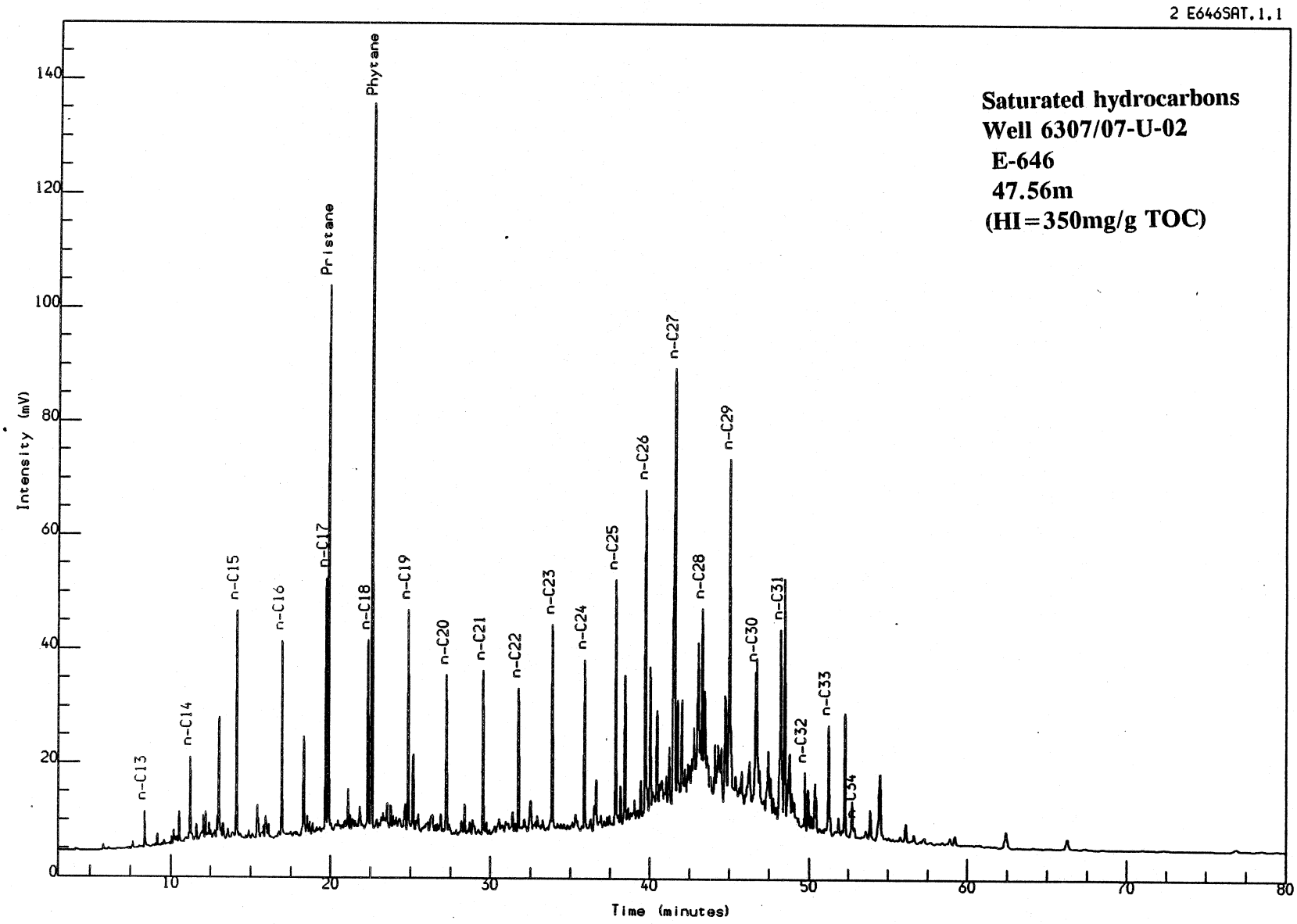
total saturated hydrocarbons

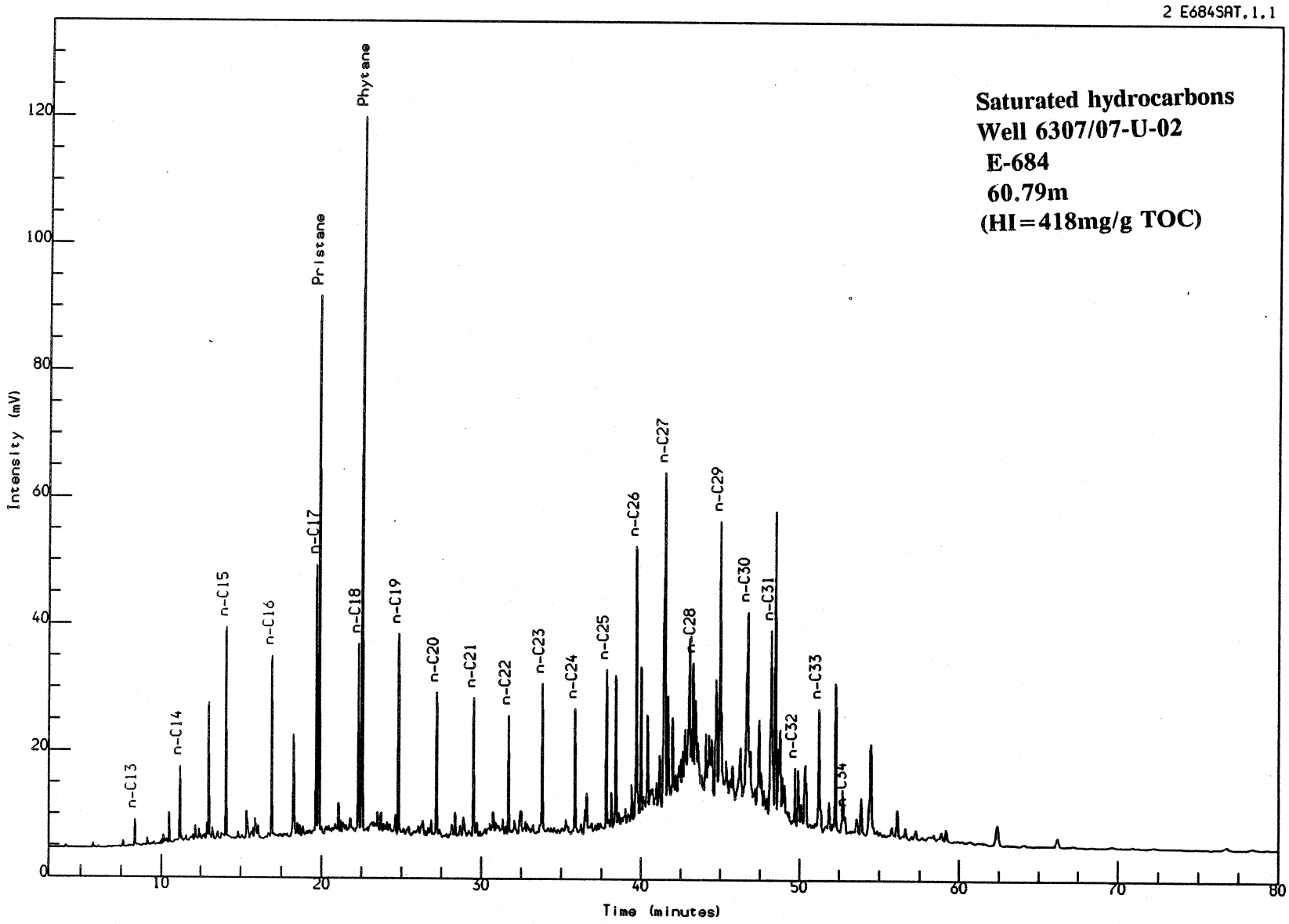

2 E619SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-619
34.83m
(HI=212mg/g TOC)
Intensity (mV)
Time (minutes)
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
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n-C32
n-C33
n-C34

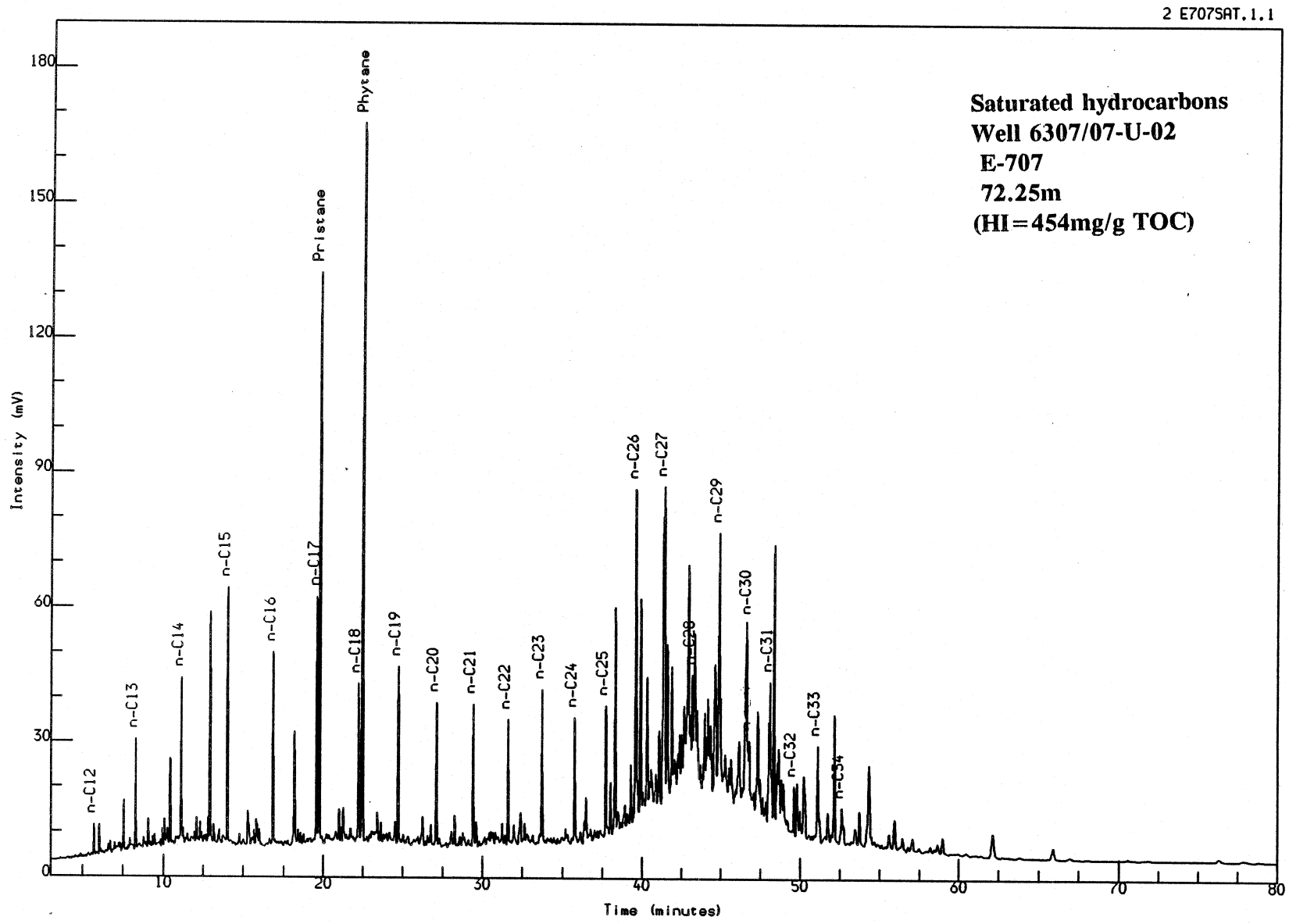

2 E630SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-630
40.28m
(HI=267mg/g TOC)
Intensity (mV)
Time (minutes)
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
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n-C31
n-C32
n-C33
n-C34

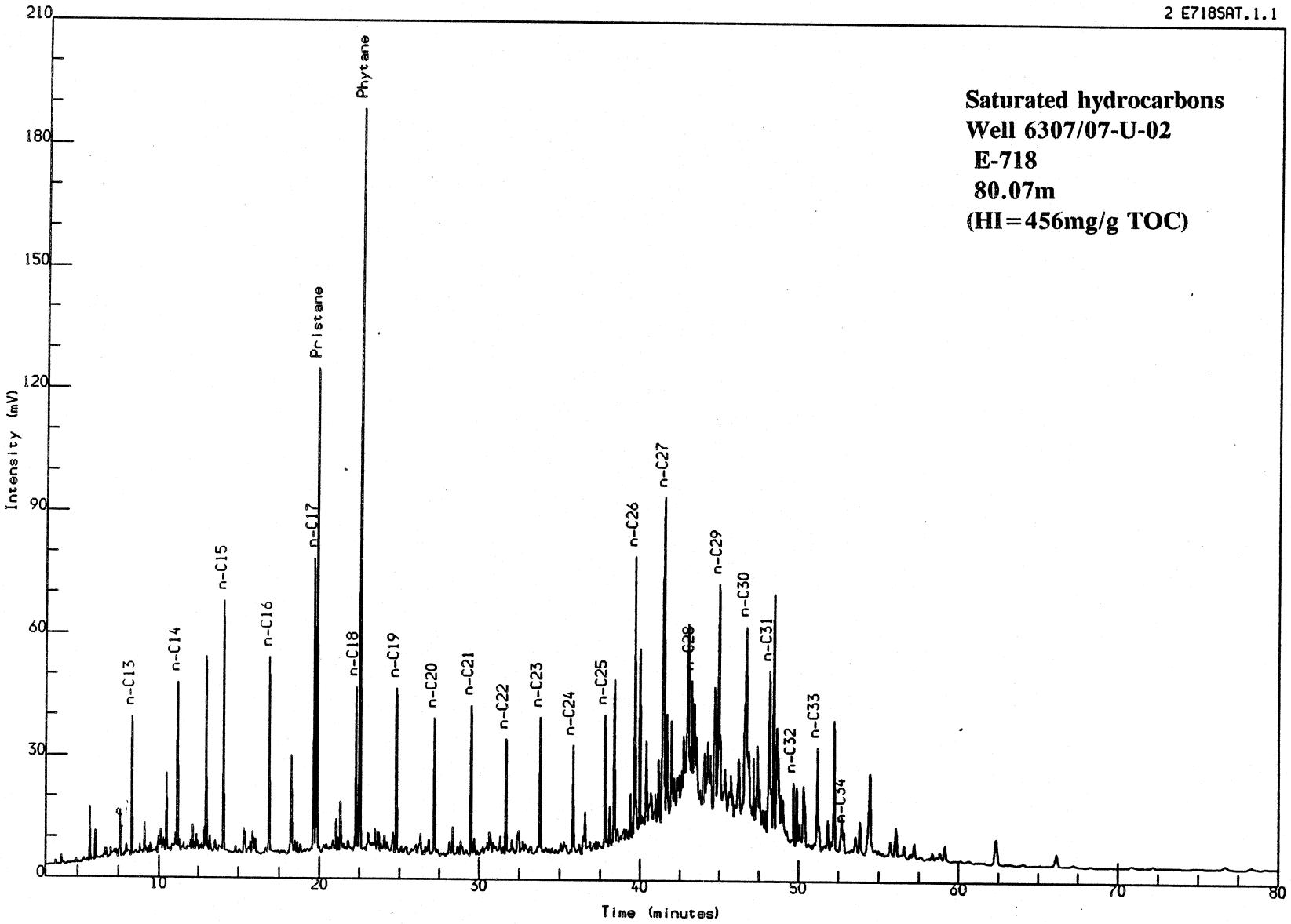

2 E632SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-632
40.78m
(HI=437mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
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n-C31
n-C32
n-C33
n-C34

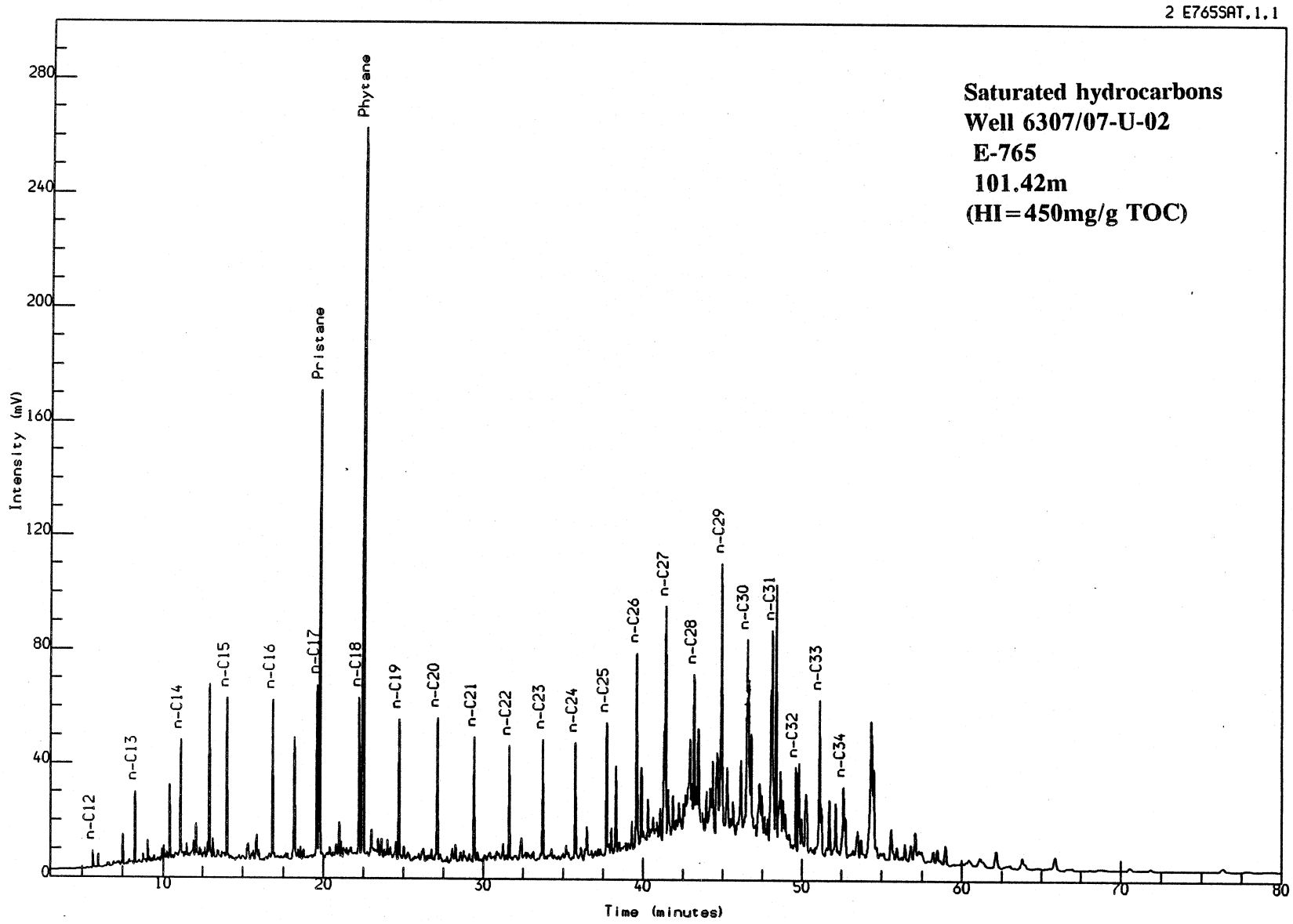

2 E640SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-640
44.16m
(HI=432mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E646SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-646
47.56m
(HI=350mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E684SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-684
60.79m
(HI=418mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
Pristane
n-C17
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E707SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-707
72.25m
(HI=454mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E718SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-718
80.07m
(HI=456mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E765SAT.1.1
Saturated hydrocarbons
Well 6307/07-U-02
E-765
101.42m
(HI=450mg/g TOC)
Intensity (mV)
Time (minutes)
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
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n-C32
n-C33
n-C34

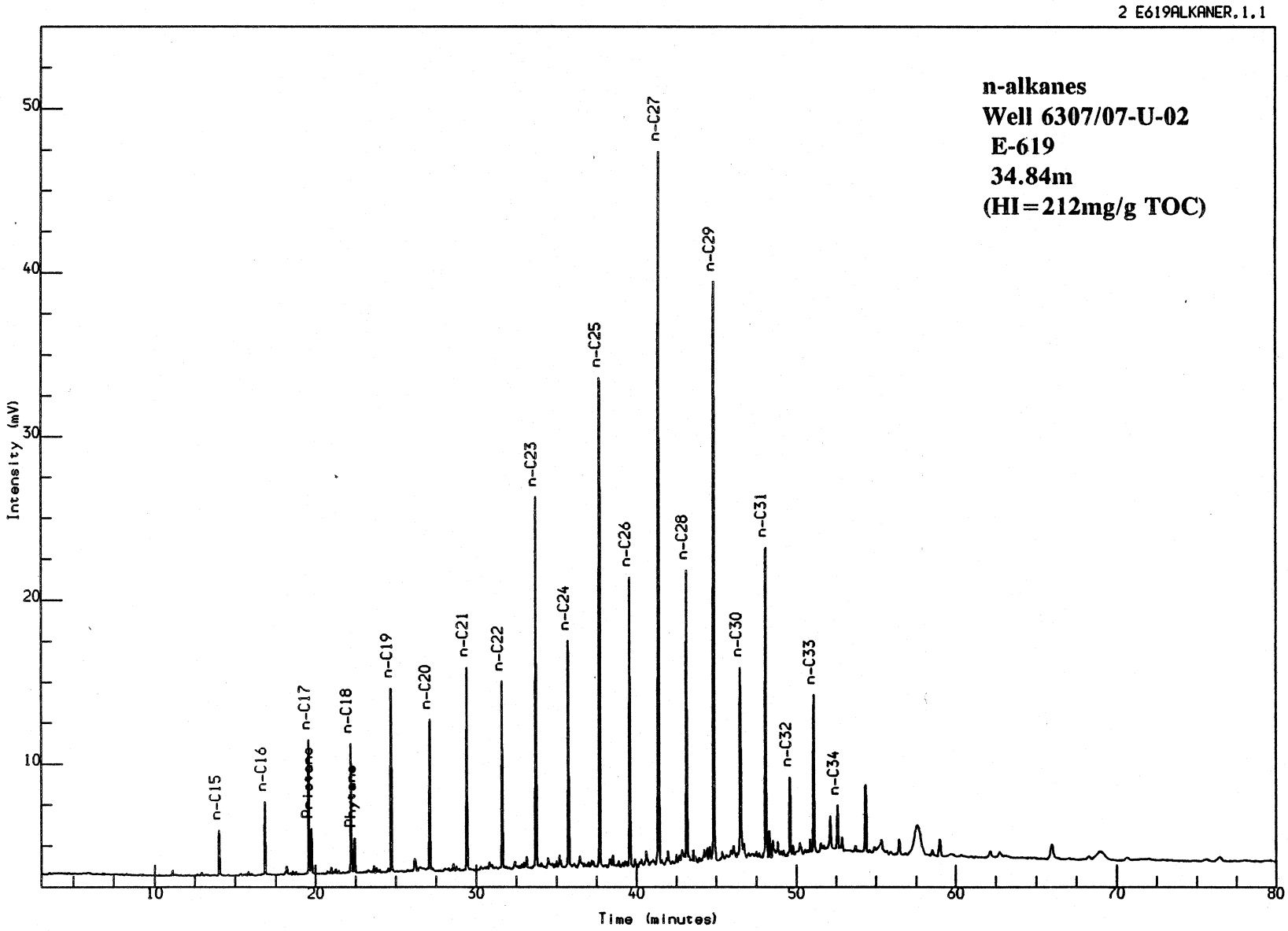
IKU SINTEF-GRUPPEN

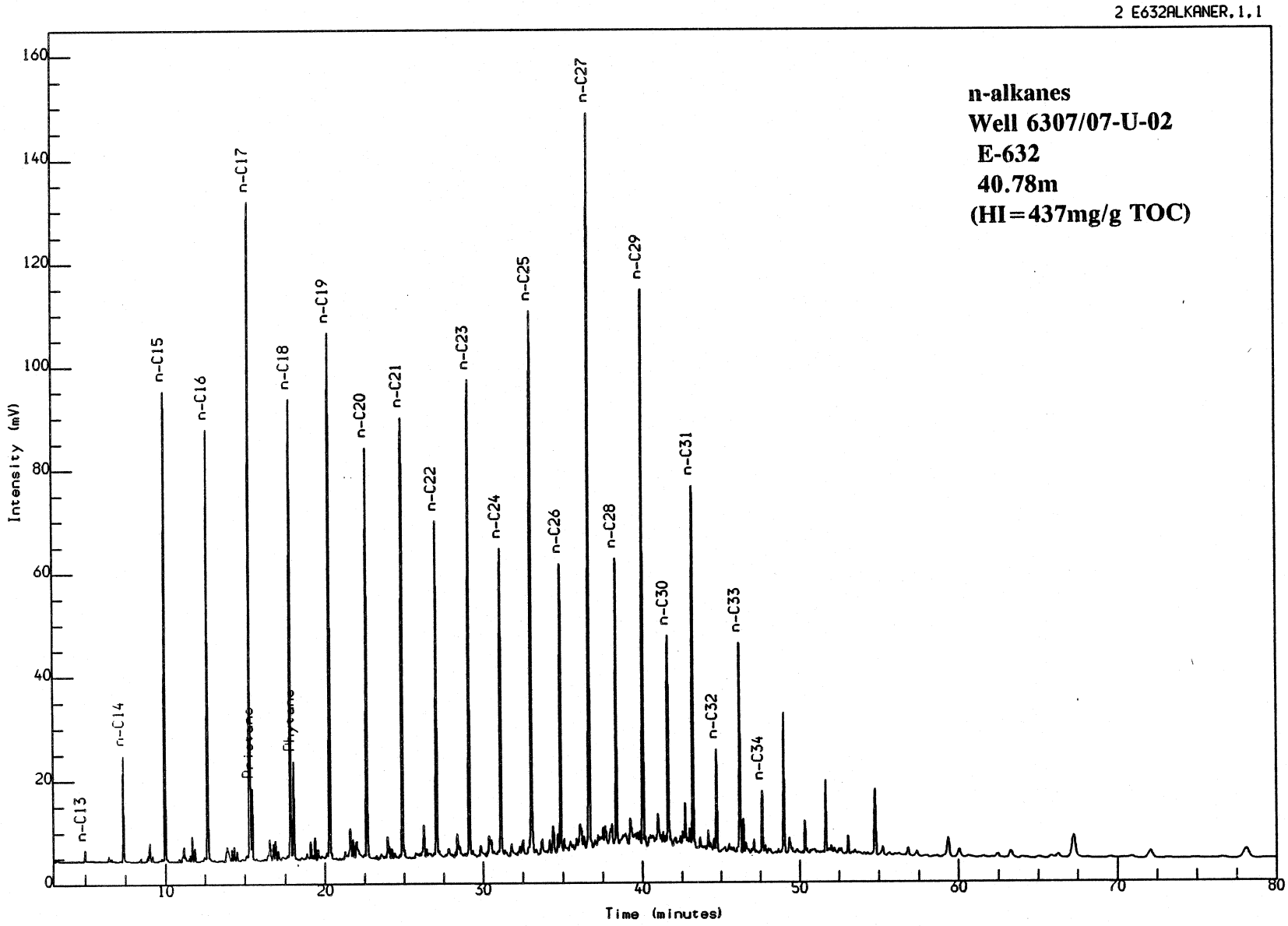
Figure III.6.2

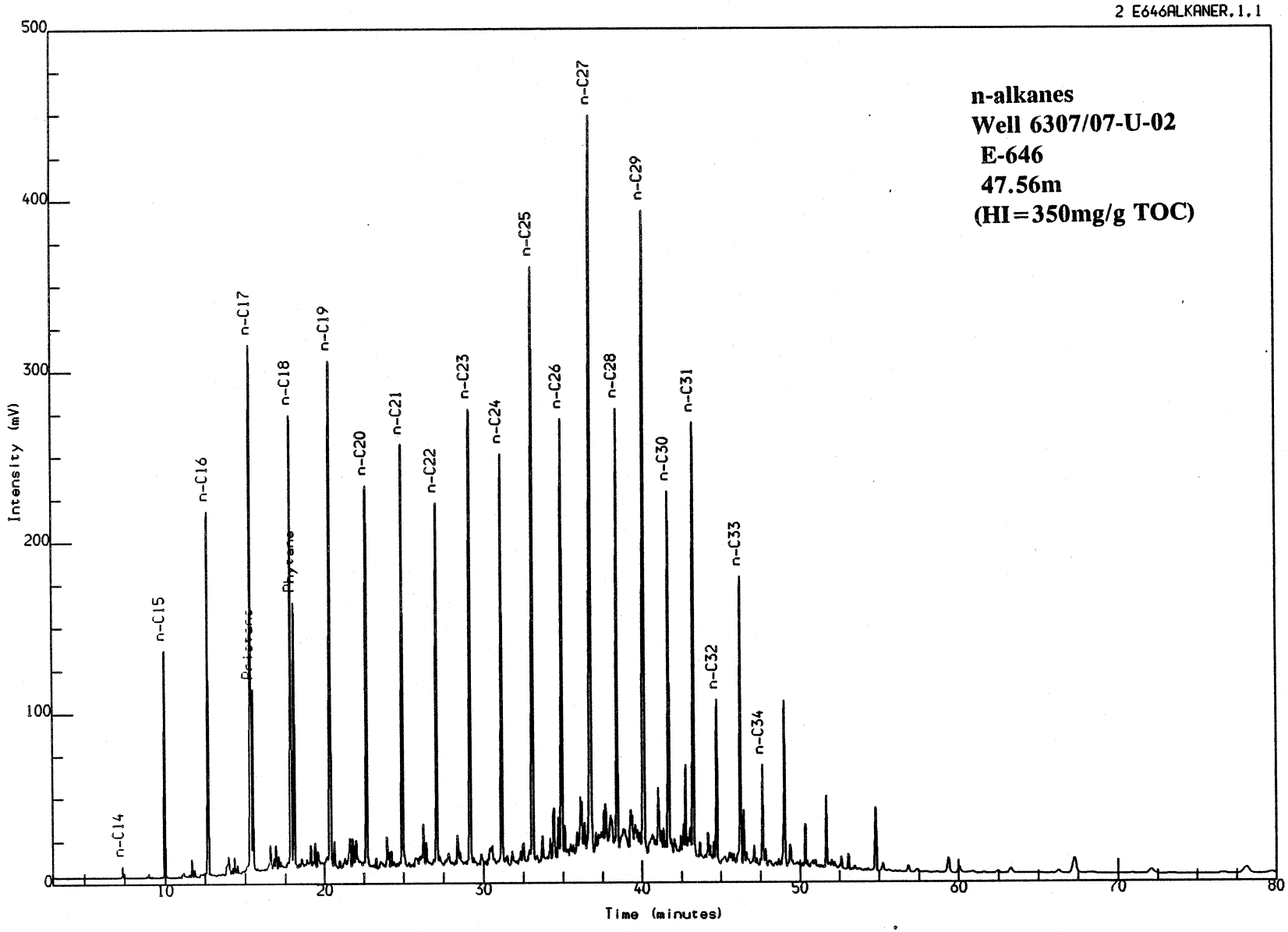
Gas chromatograms

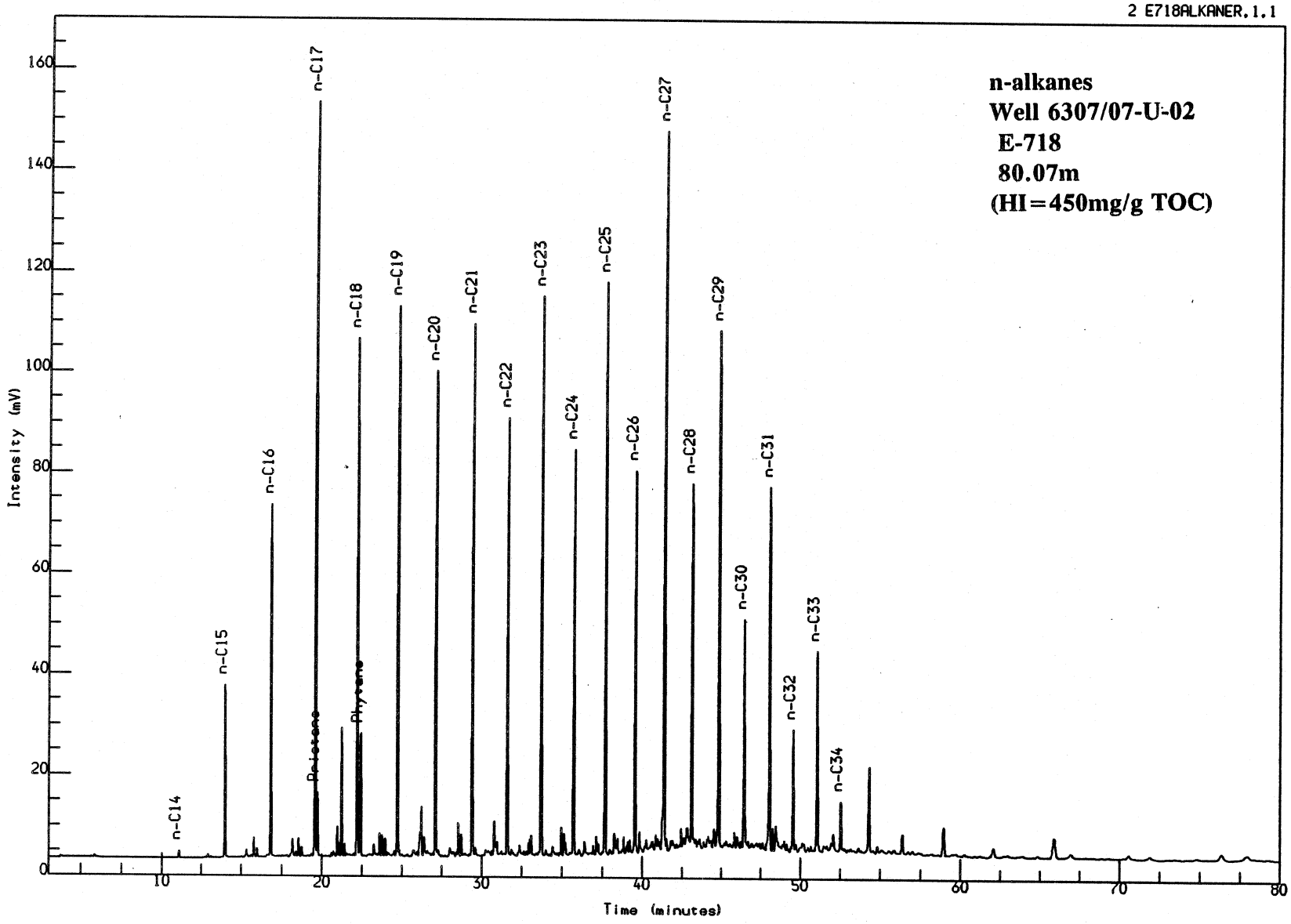
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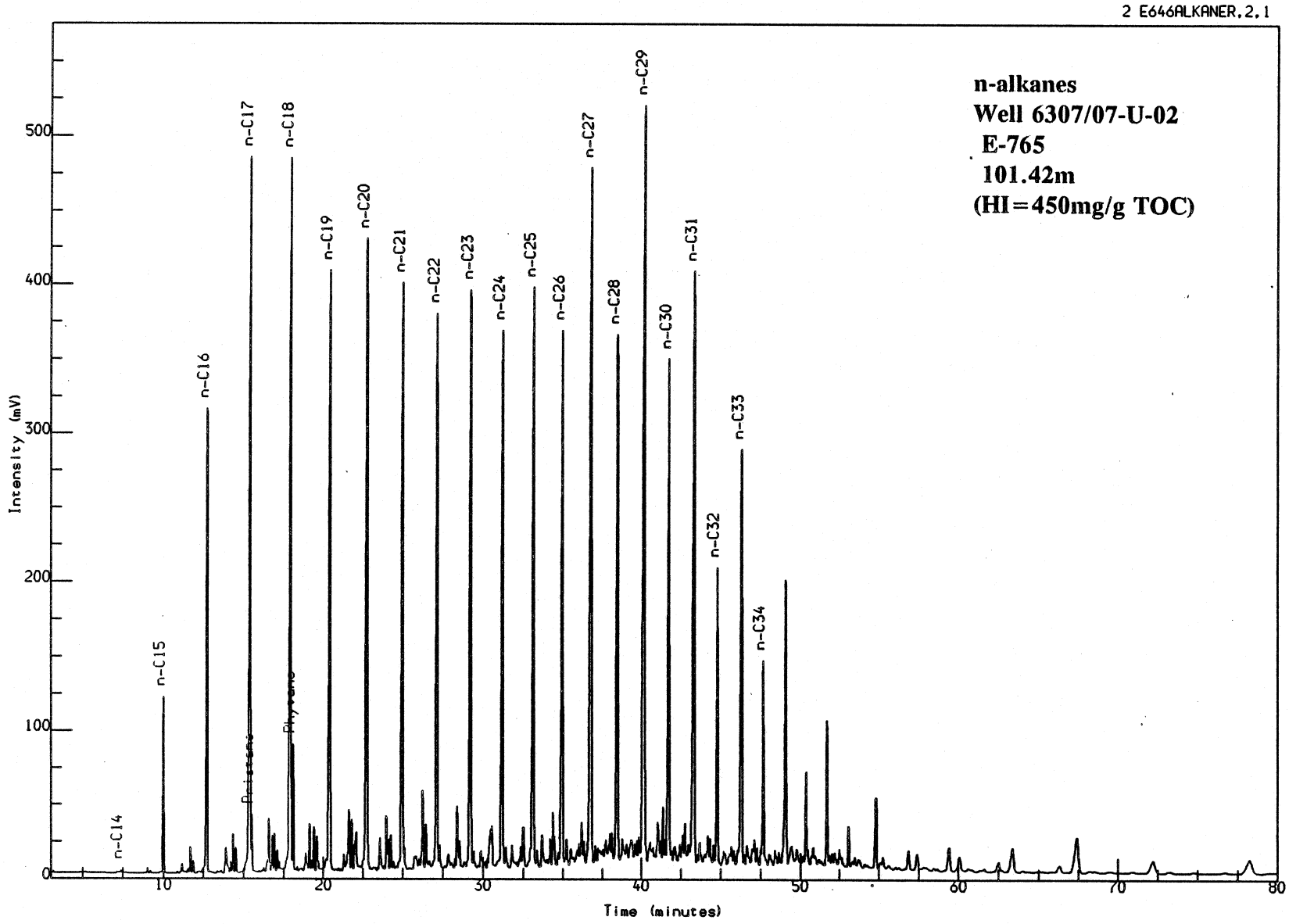
n-alkanes


2 E619ALKANER.1.1
n-alkanes
Well 6307/07-U-02
E-619
34.84m
(HI=212mg/g TOC)
Intensity (mV)
Time (minutes)
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E632ALKANER,1,1
n-alkanes
Well 6307/07-U-02
E-632
40.78m
(HI=437mg/g TOC)
Intensity (mV)
Time (minutes)
n-C13
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E646ALKANER.1.1
n-alkanes
Well 6307/07-U-02
E-646
47.56m
(HI=350mg/g TOC)
Intensity (mV)
Time (minutes)
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E718ALKANER.1.1
n-alkanes
Well 6307/07-U-02
E-718
80.07m
(HI=450mg/g TOC)
Intensity (mV)
Time (minutes)
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34


2 E646ALKANER.2.1
n-alkanes
Well 6307/07-U-02
E-765
101.42m
(HI=450mg/g TOC)
n-C14
n-C15
n-C16
n-C17
Pristane
n-C18
Phytane
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
Intensity (mV)
Time (minutes)
0
100
200
300
400
500
10
20
30
40
50
60
70
80

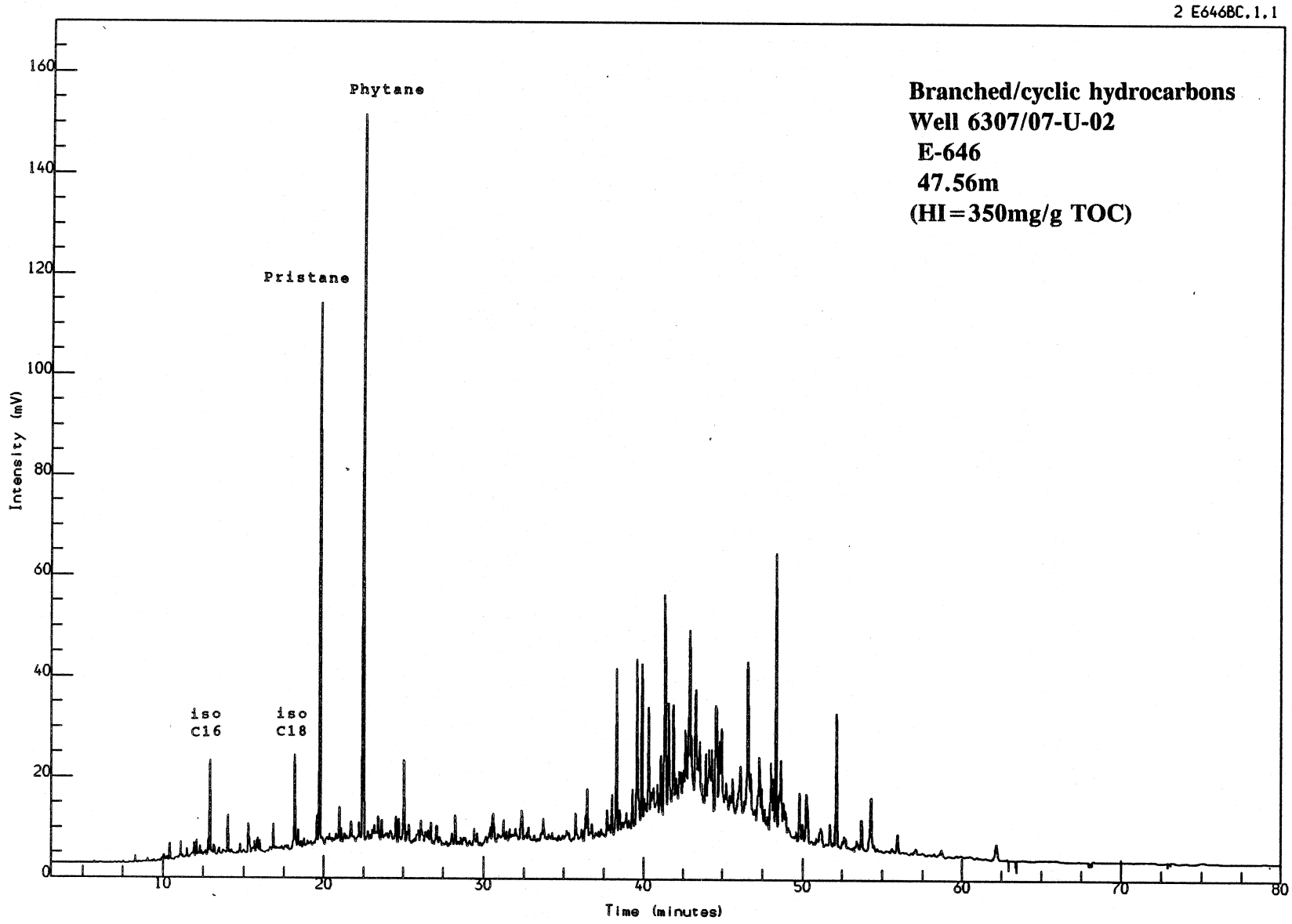
IKU SINTEF-GRUPPEN

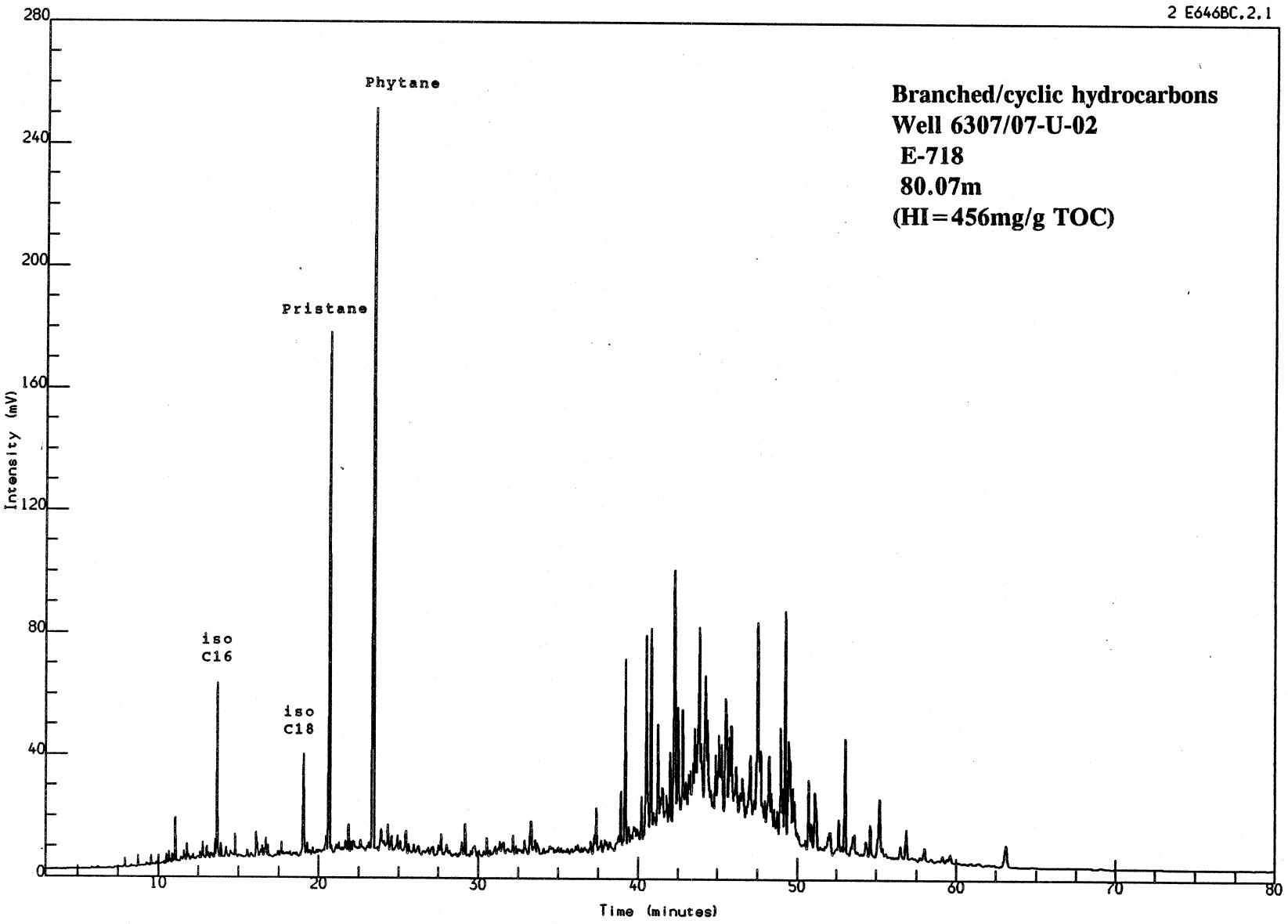
Figure III.6.3

Gas chromatogram

of

branched/cycloalkanes


2 E646BC.1.1
Branched/cyclic hydrocarbons
Well 6307/07-U-02
E-646
47.56m
(HI=350mg/g TOC)
Phytane
Pristane
iso C16
iso C18
Intensity (mV)
Time (minutes)
0
20
40
60
80
100
120
140
160
10
20
30
40
50
60
70
80


2 E646BC.2.1
Branched/cyclic hydrocarbons
Well 6307/07-U-02
E-718
80.07m
(HI=456mg/g TOC)
Phytane
Pristane
iso C16
iso C18
Intensity (mV)
Time (minutes)
0
40
80
120
160
200
240
280
10
20
30
40
50
60
70
80

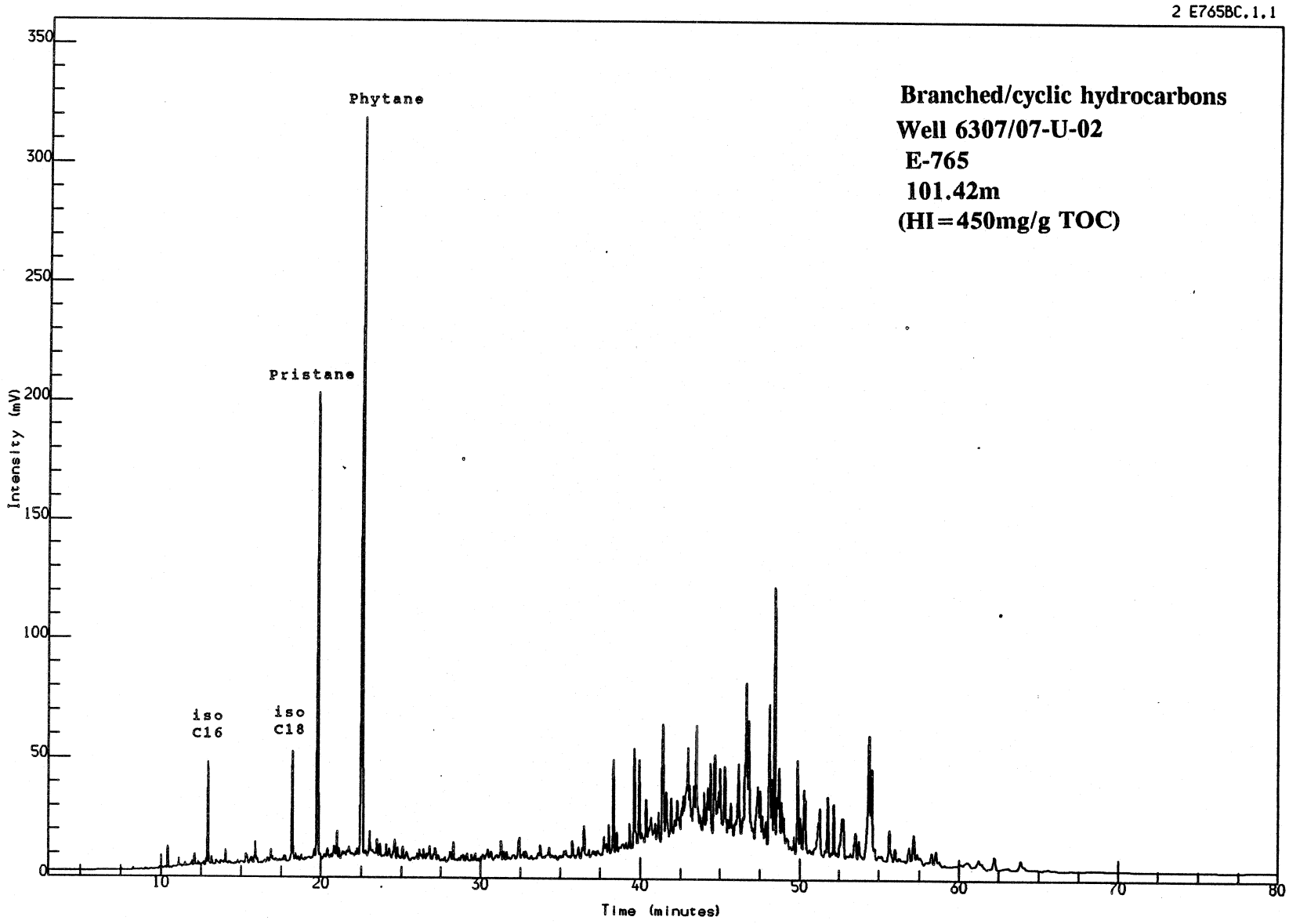
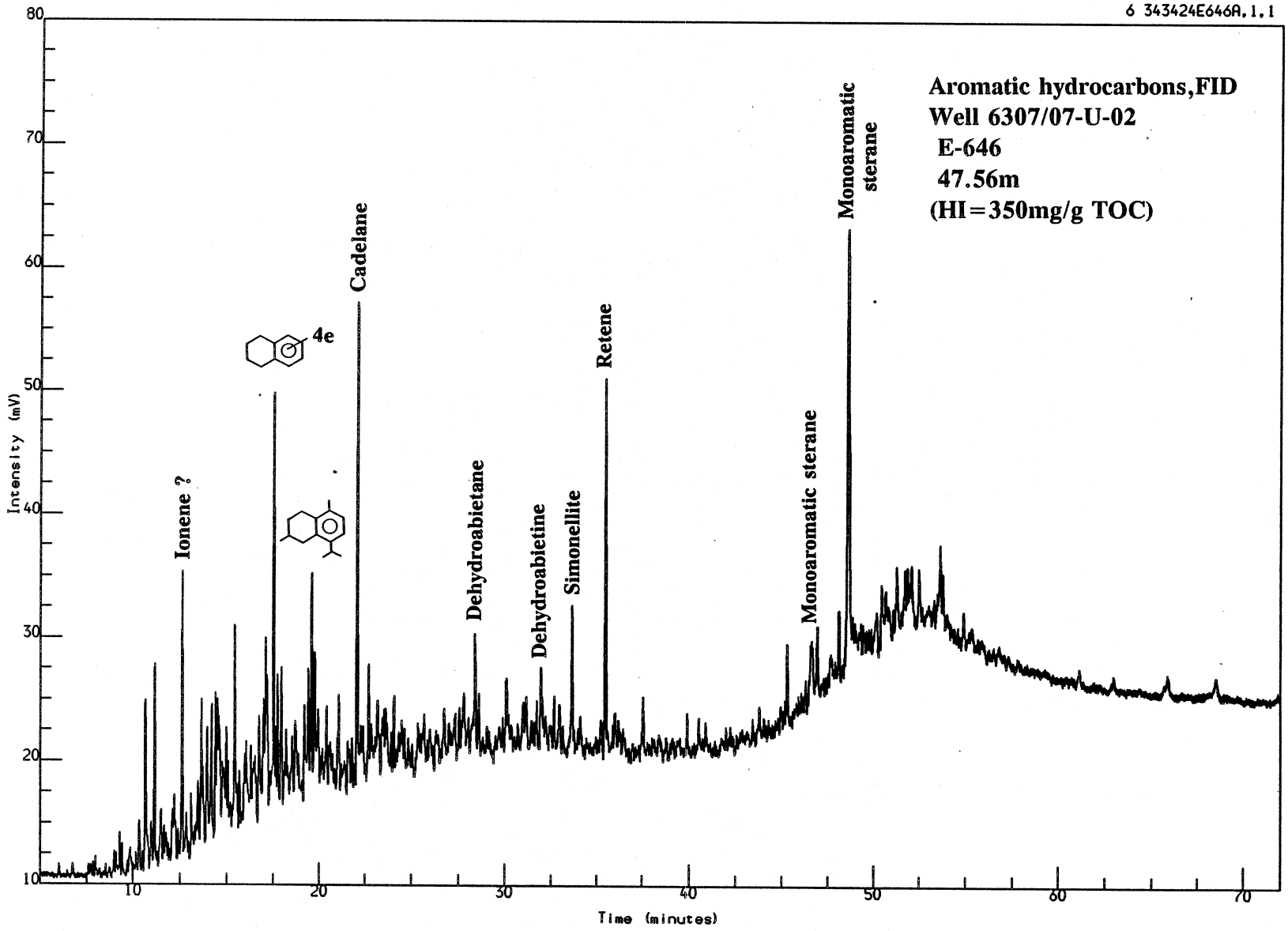

2 E765BC.1.1
Branched/cyclic hydrocarbons
Well 6307/07-U-02
E-765
101.42m
(HI=450mg/g TOC)
Phytane
Pristane
iso C16
iso C18
Intensity (mV)
Time (minutes)
0
50
100
150
200
250
300
350
10
20
30
40
50
60
70
80

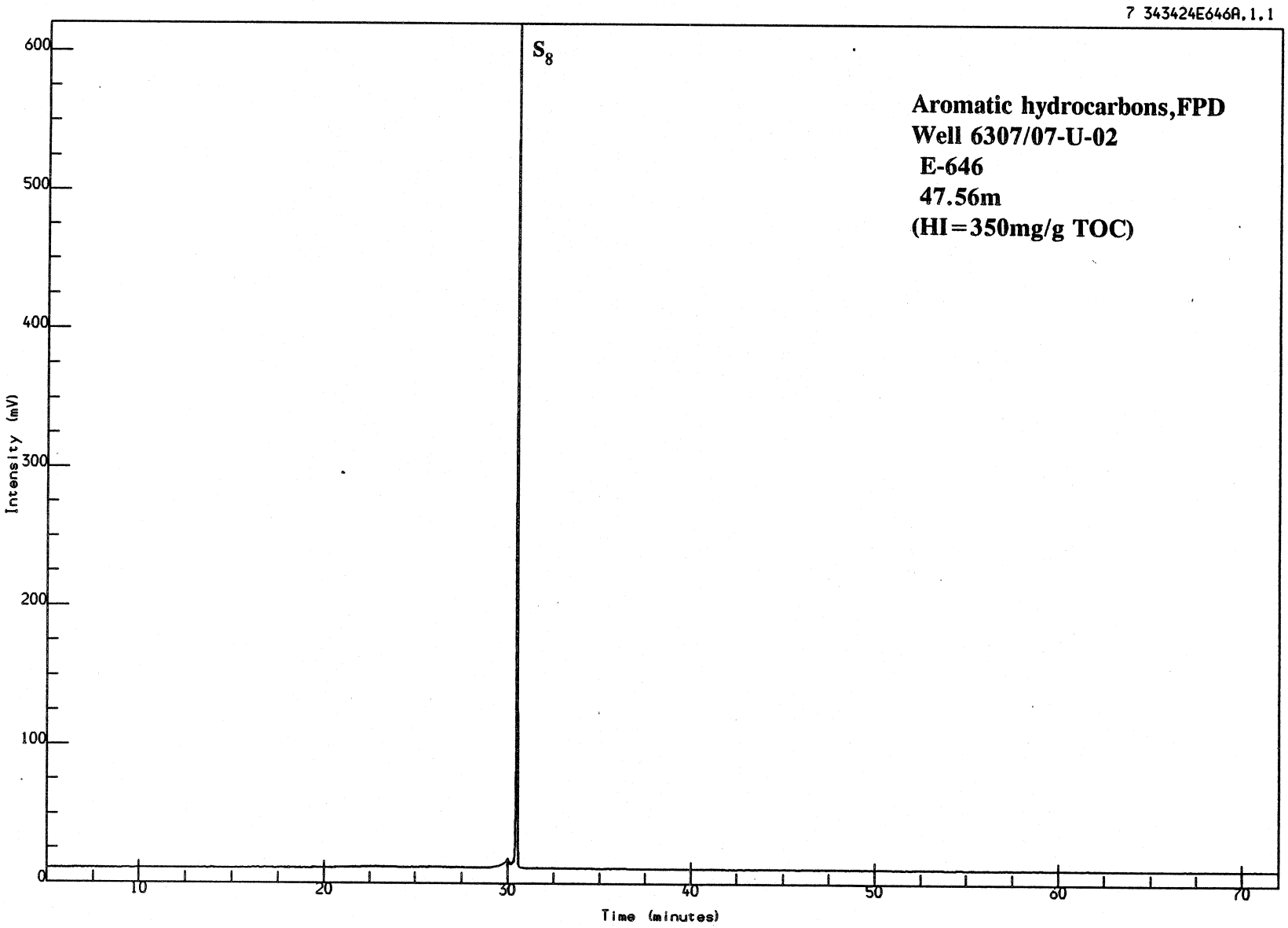
Figure III.6.4

Gas chromatograms (FID/FPD)

of

arenes and sulphur (aromatics)


6 343424E646A.1.1
Aromatic hydrocarbons,FID
Well 6307/07-U-02
E-646
47.56m
(HI=350mg/g TOC)
Intensity (mV)
Time (minutes)
Ionene ?
4e
Cadelane
Dehydroabietane
Dehydroabietine
Simonellite
Retene
Monoaromatic sterane
Monoaromatic sterane


7 343424E646A.1.1
S_8
Aromatic hydrocarbons,FPD
Well 6307/07-U-02
E-646
47.56m
(HI=350mg/g TOC)
Intensity (mV)
600
500
400
300
200
100
0
10
20
30
40
50
60
70
Time (minutes)

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Figure III.6.5a

GC-MS

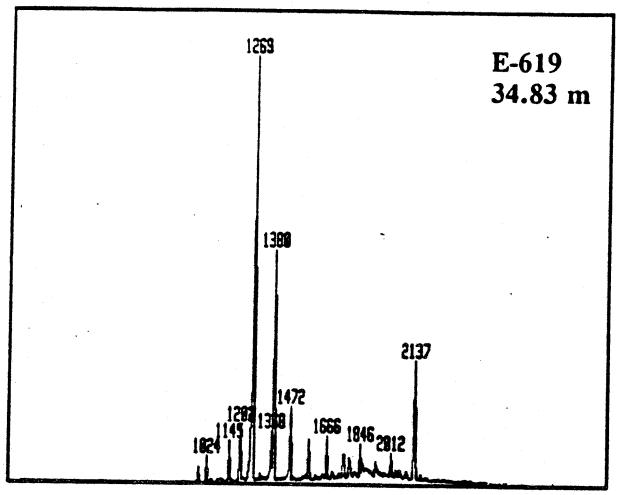
of

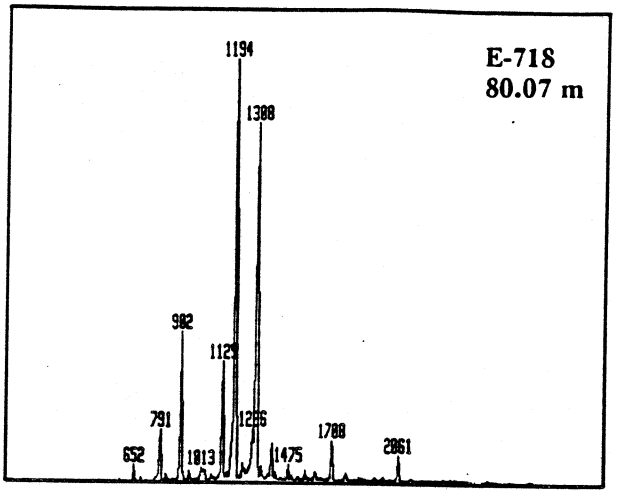
branched/cycloalkanes in extracts

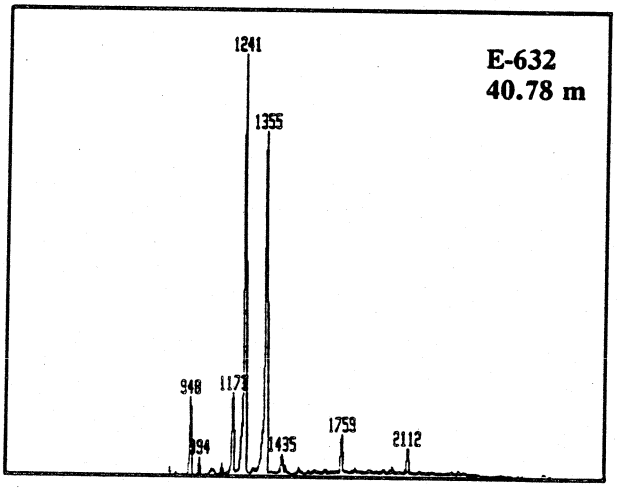
m/z 113

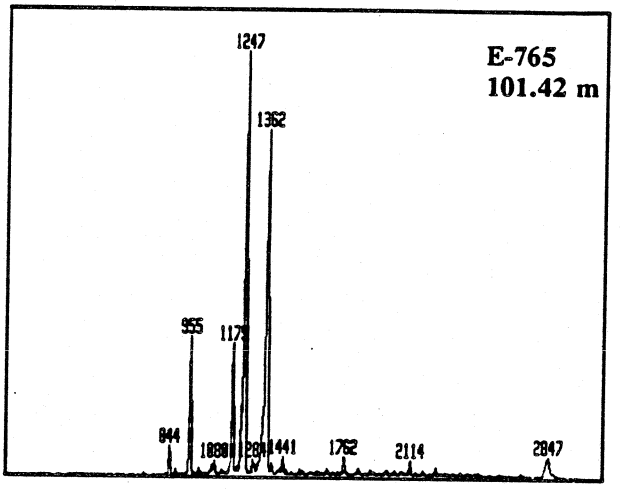
(Further identification of peaks, see section II)

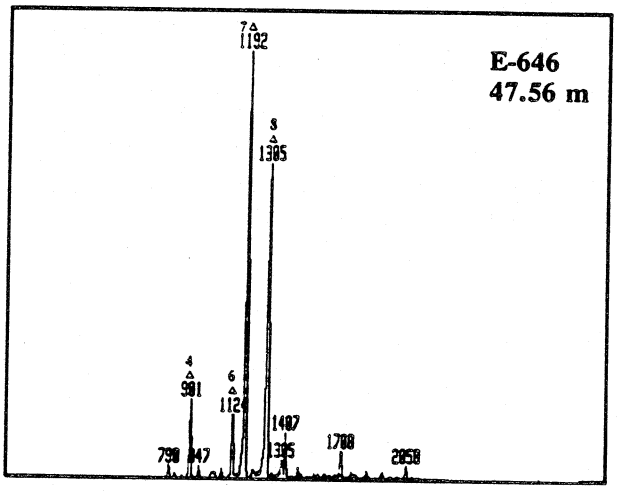
m/z 113 Isoprenoids. Core 6307/07-U-02

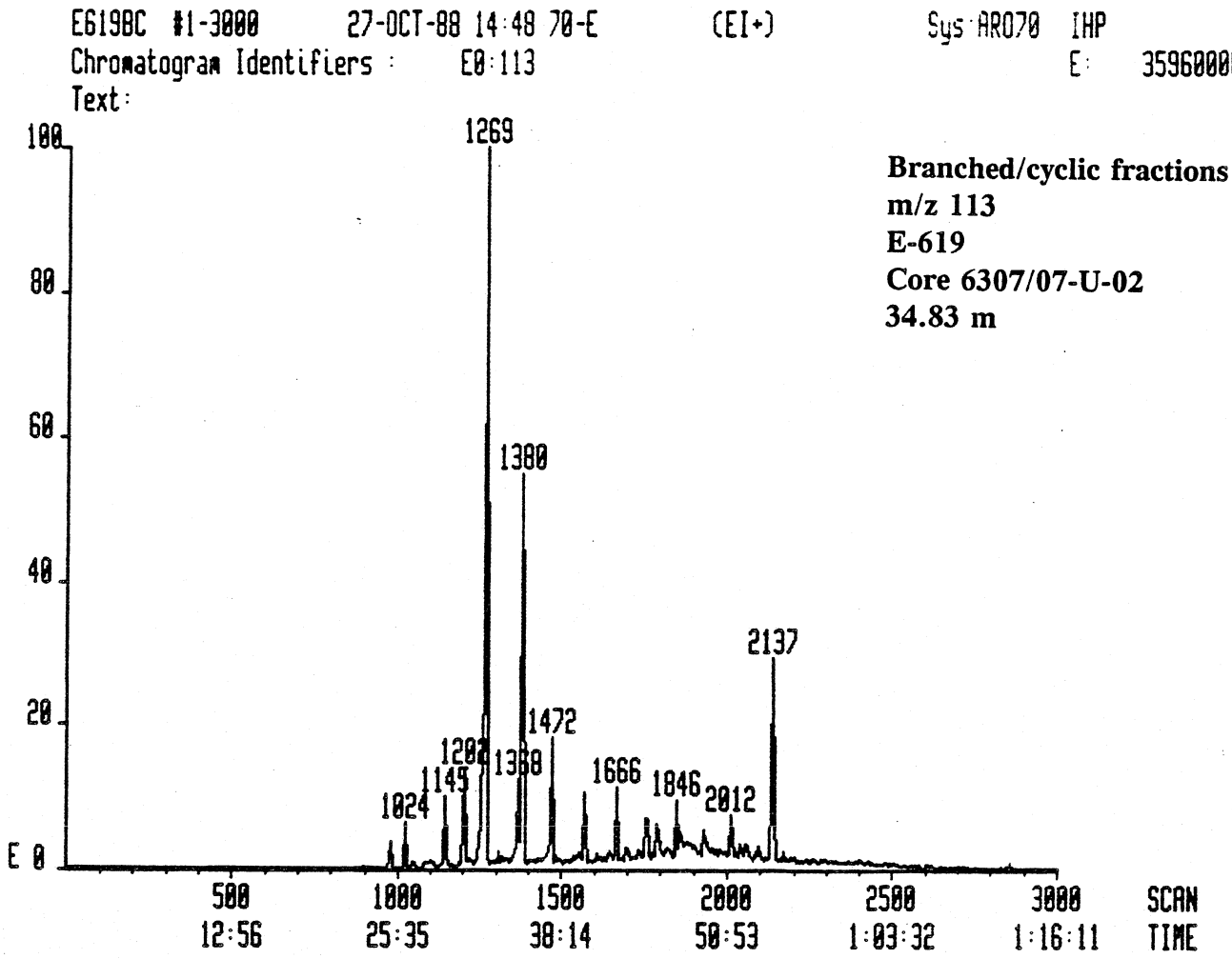




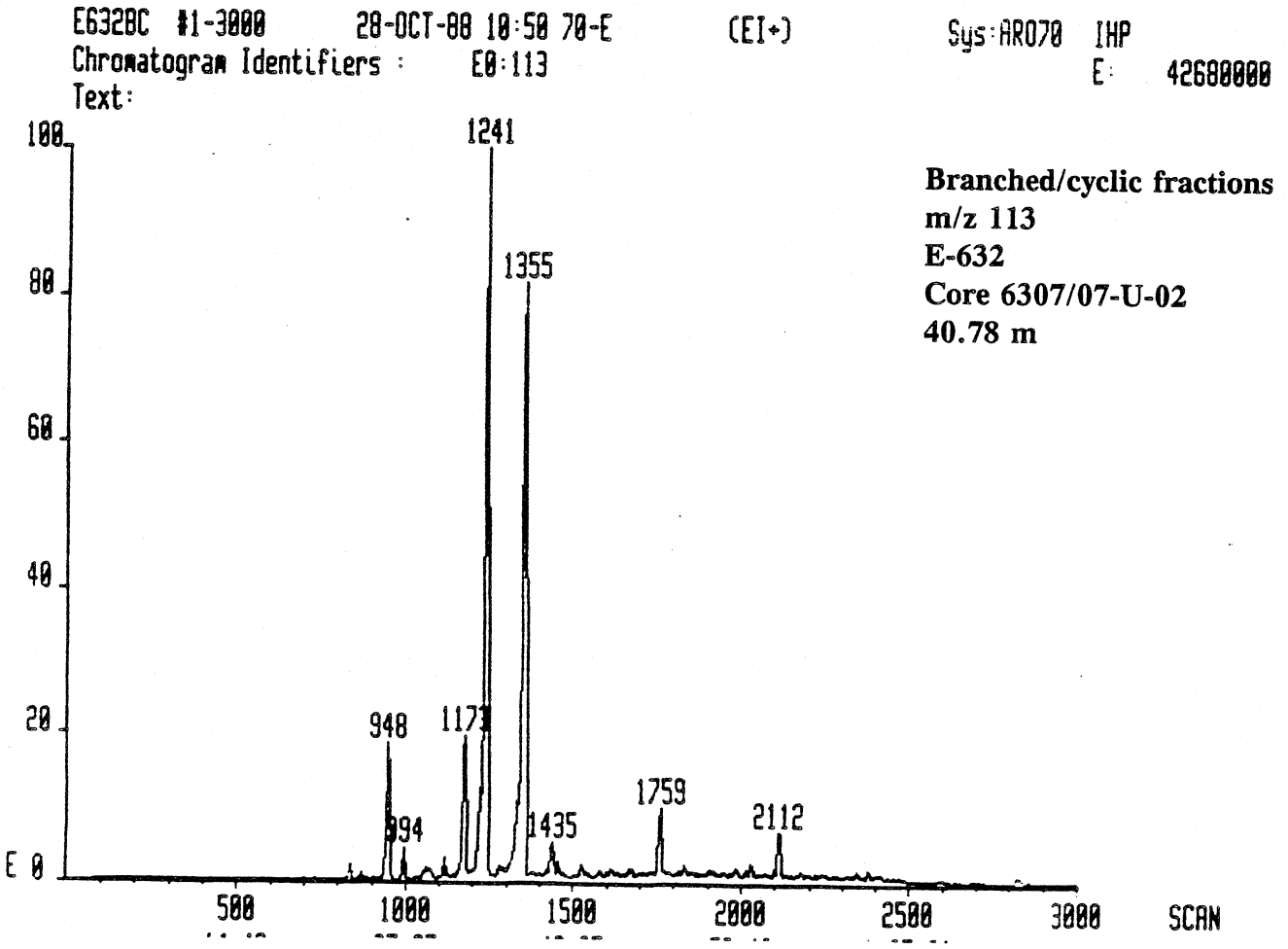




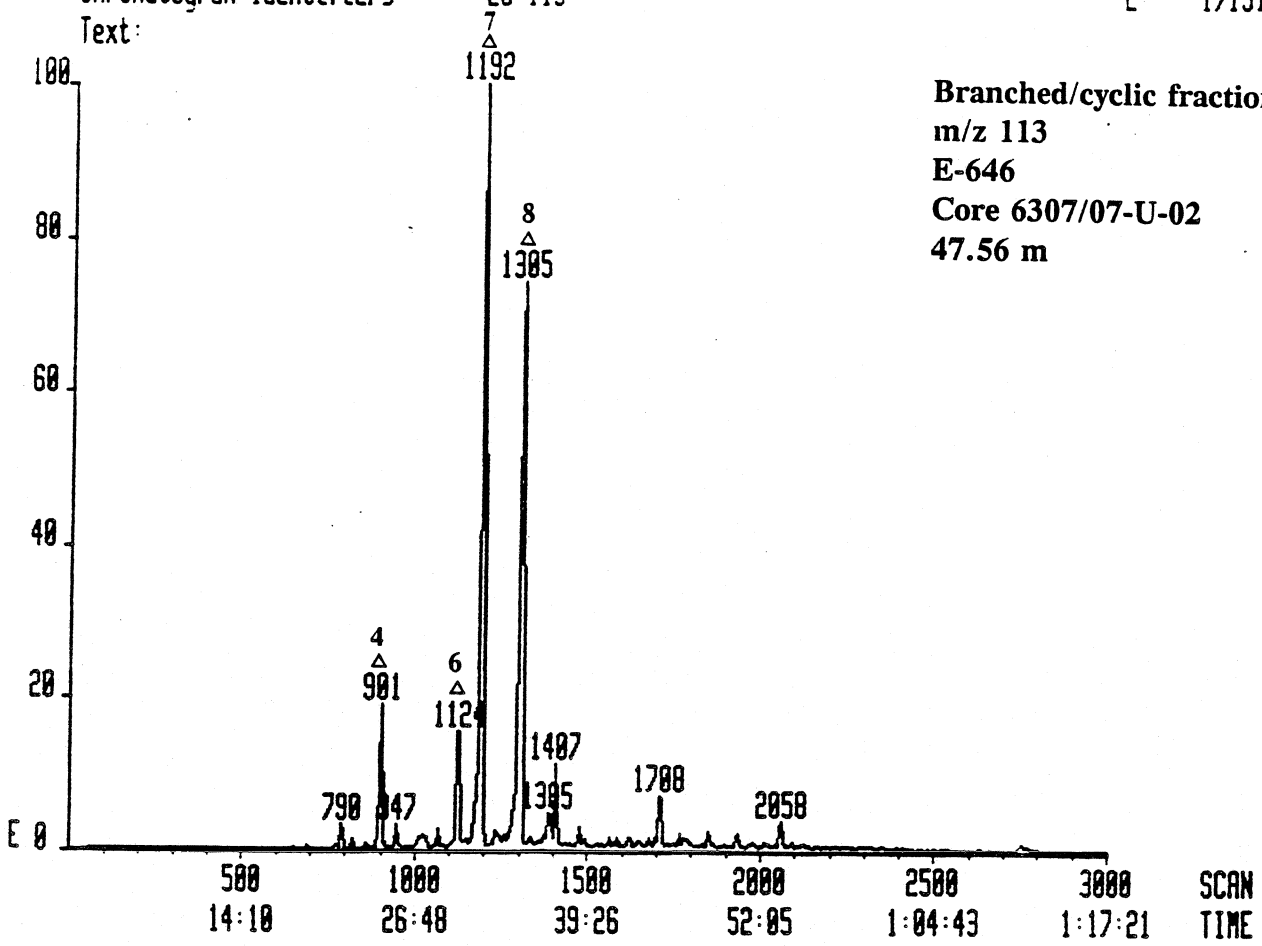




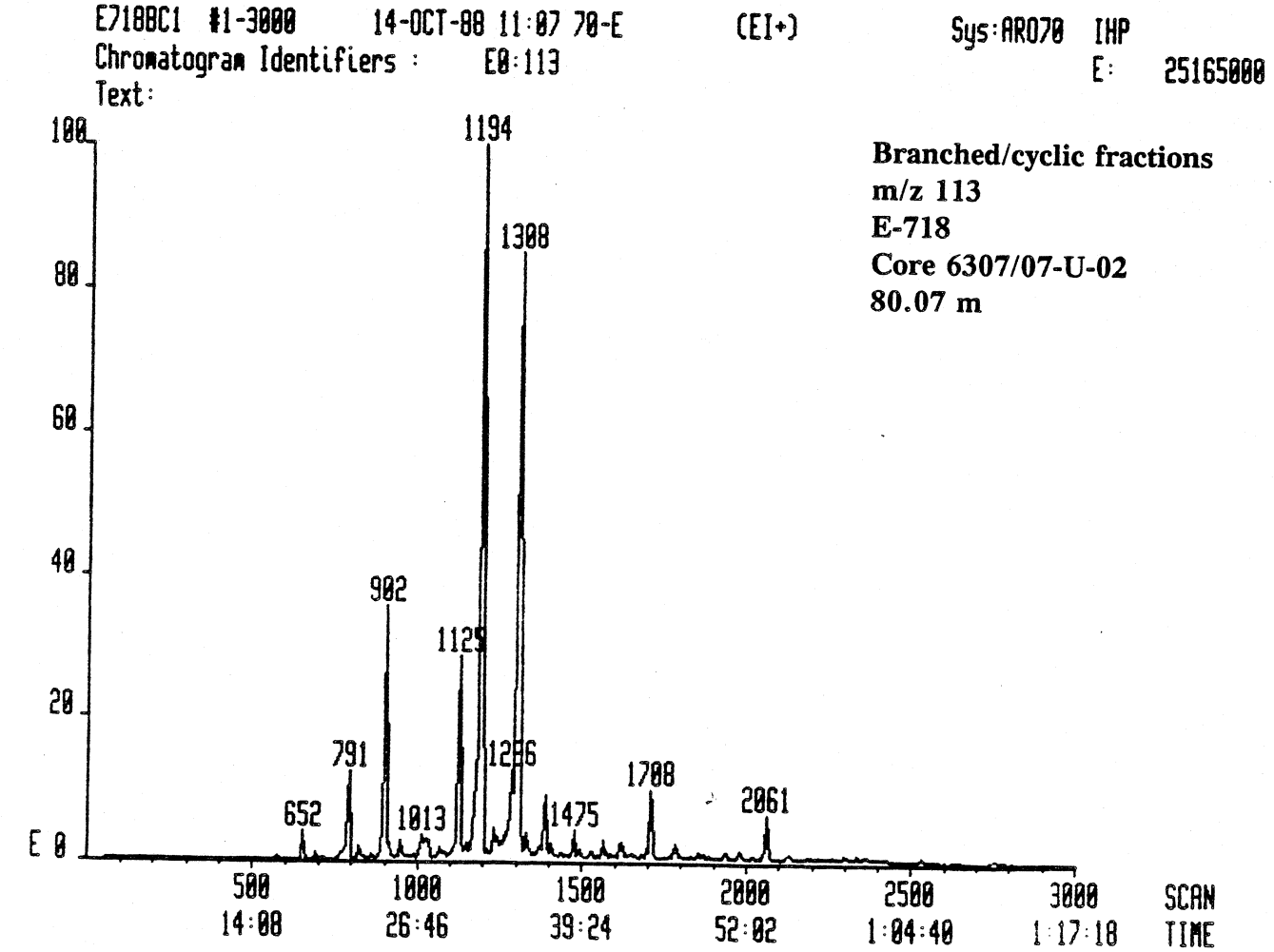
Branched/cyclic fractions
m/z 113
E-619
Core 6307/07-U-02
34.83 m



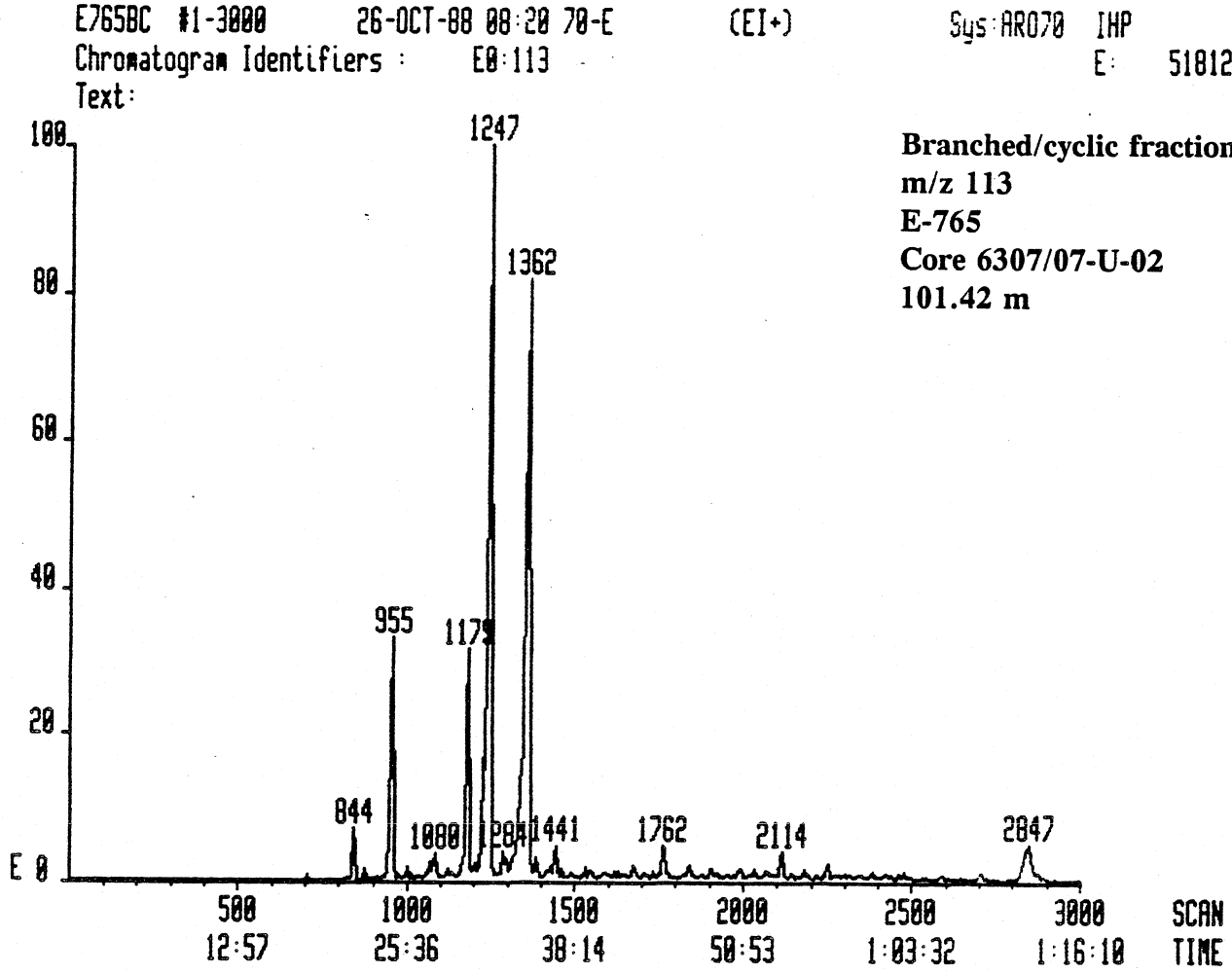
Branched/cyclic fractions
m/z 113
E-632
Core 6307/07-U-02
40.78 m



Branched/cyclic fractions
m/z 113
E-646
Core 6307/07-U-02
47.56 m



Branched/cyclic fractions
m/z 113
E-718
Core 6307/07-U-02
80.07 m



Branched/cyclic fractions
m/z 113
E-765
Core 6307/07-U-02
101.42 m

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Figure III.6.5b

GC-MS

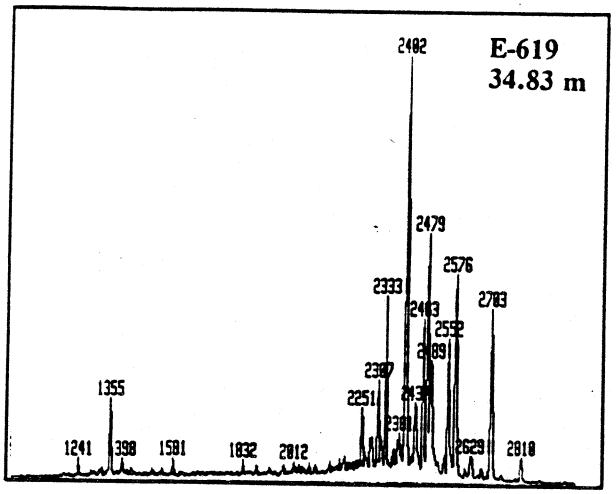
of

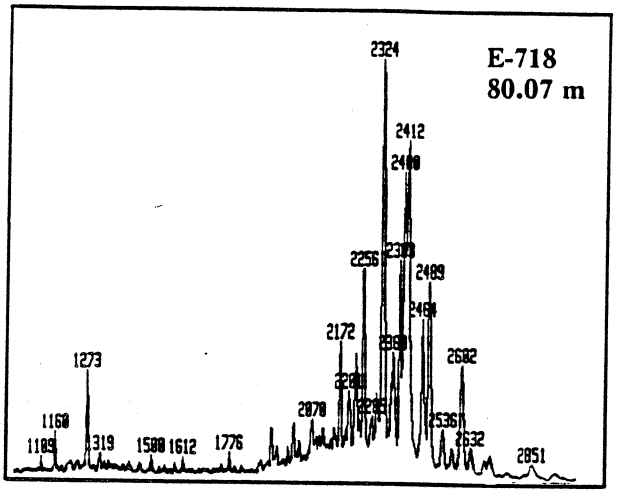
branched/cycloalkanes in extracts

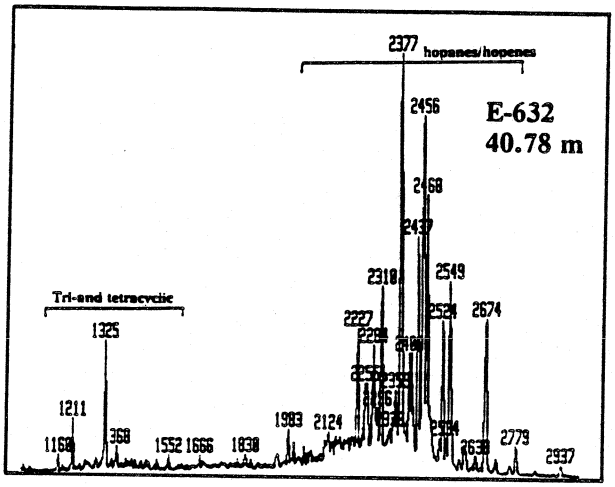
m/z 191

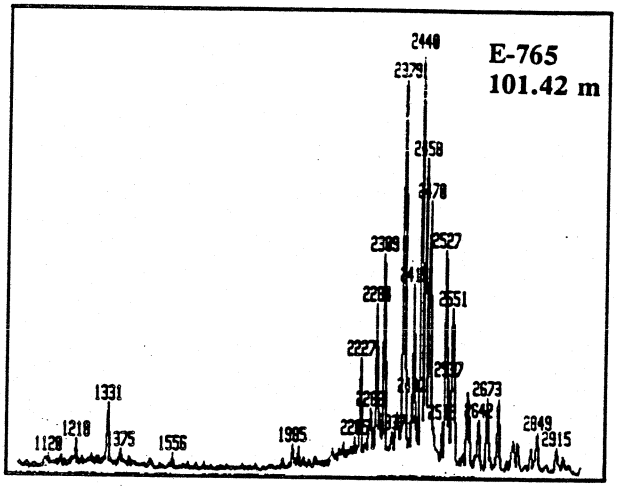
(Further identification of peaks, see section II)

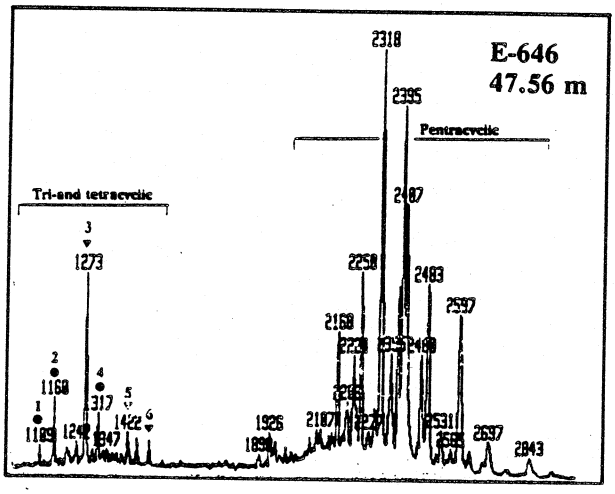
m/z 191 Terpanes/terpenes. Core 6307/07-U-02

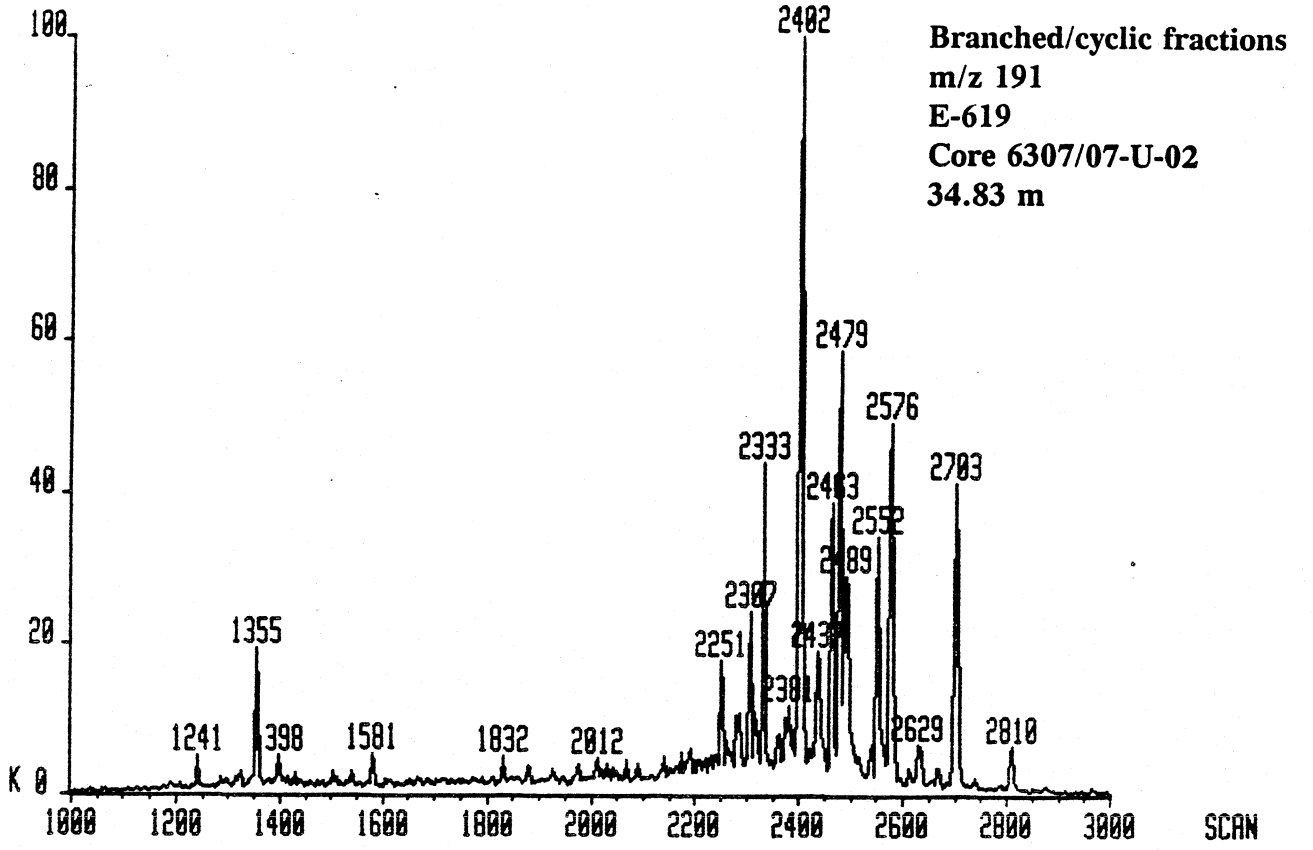


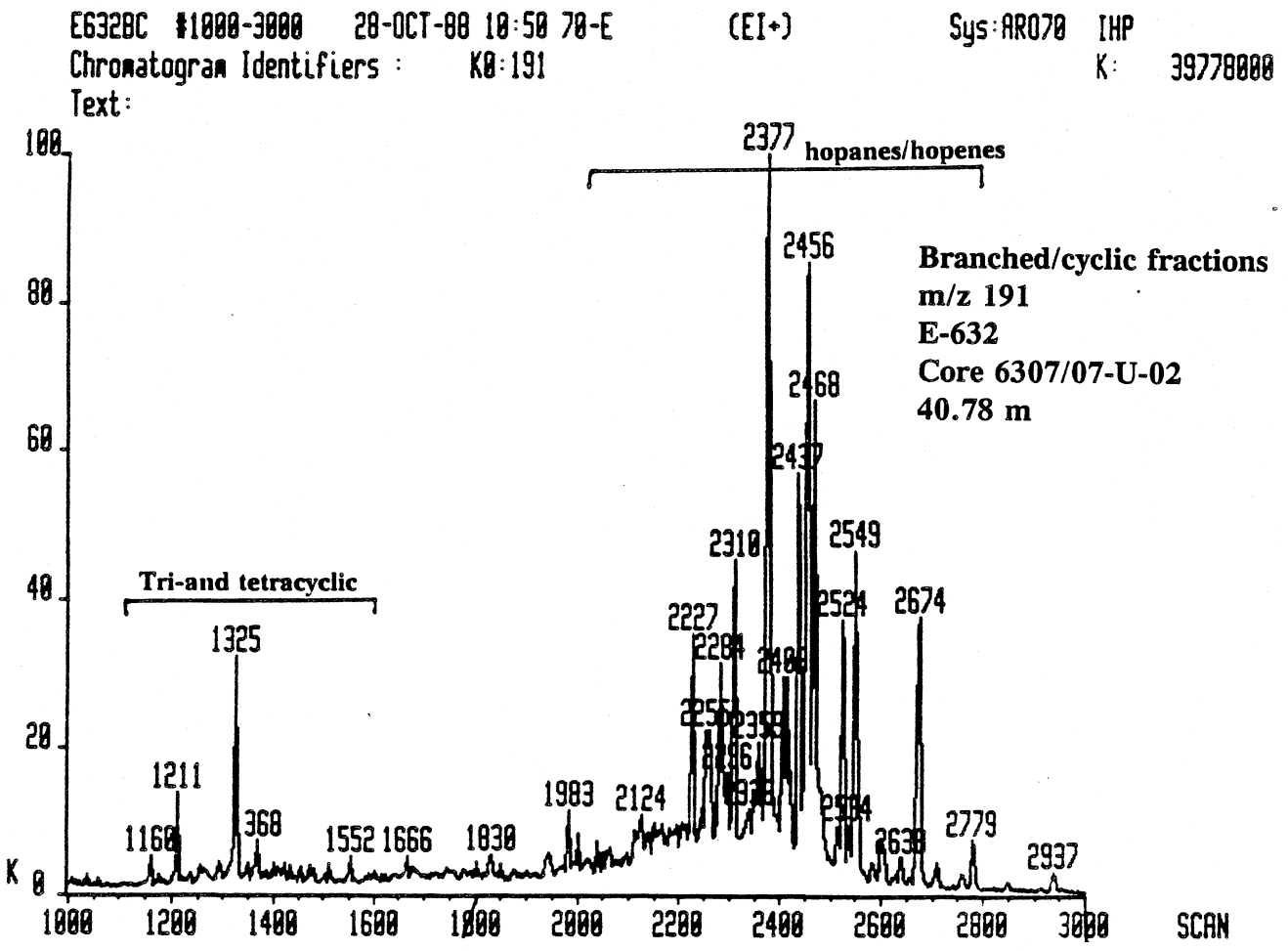


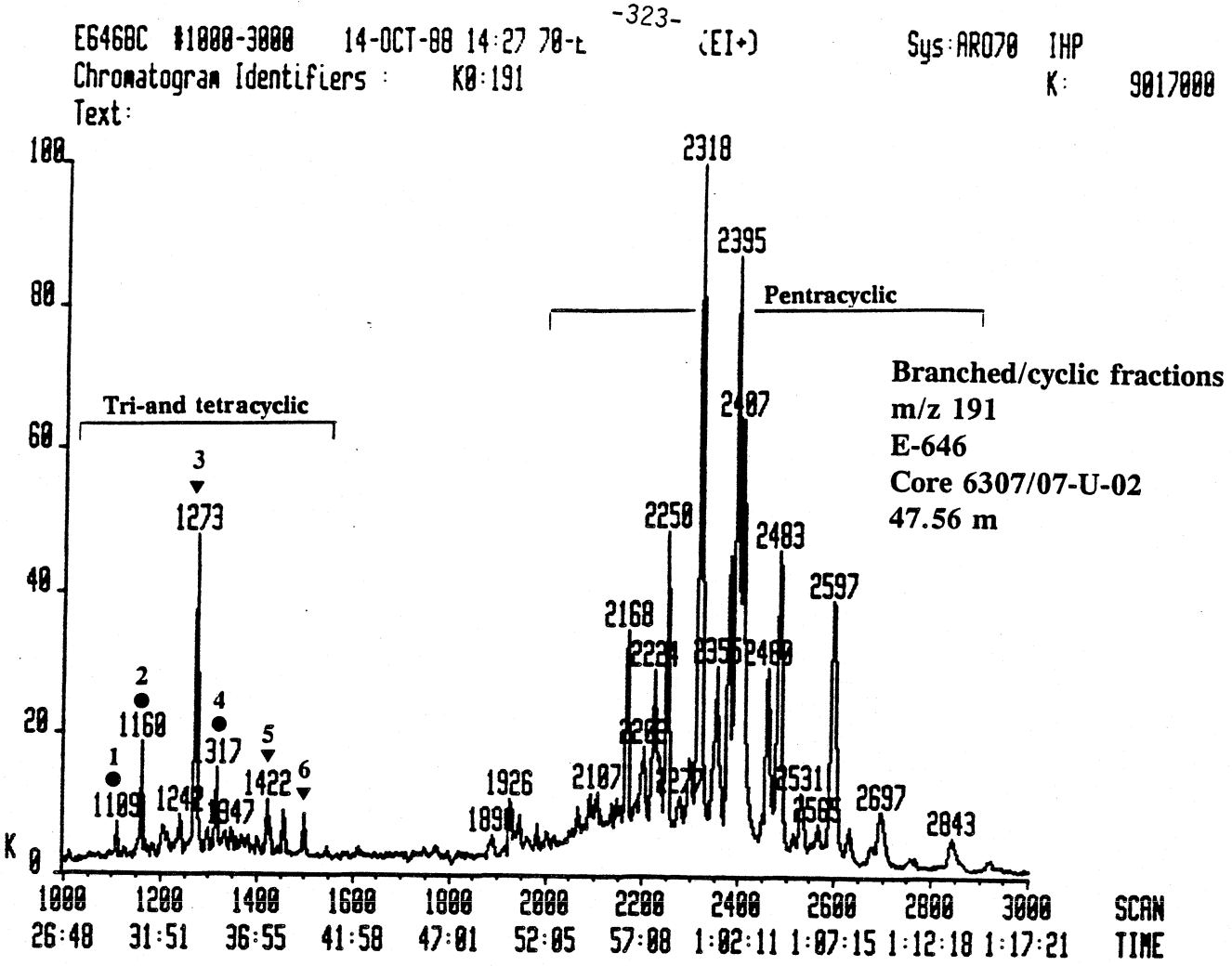


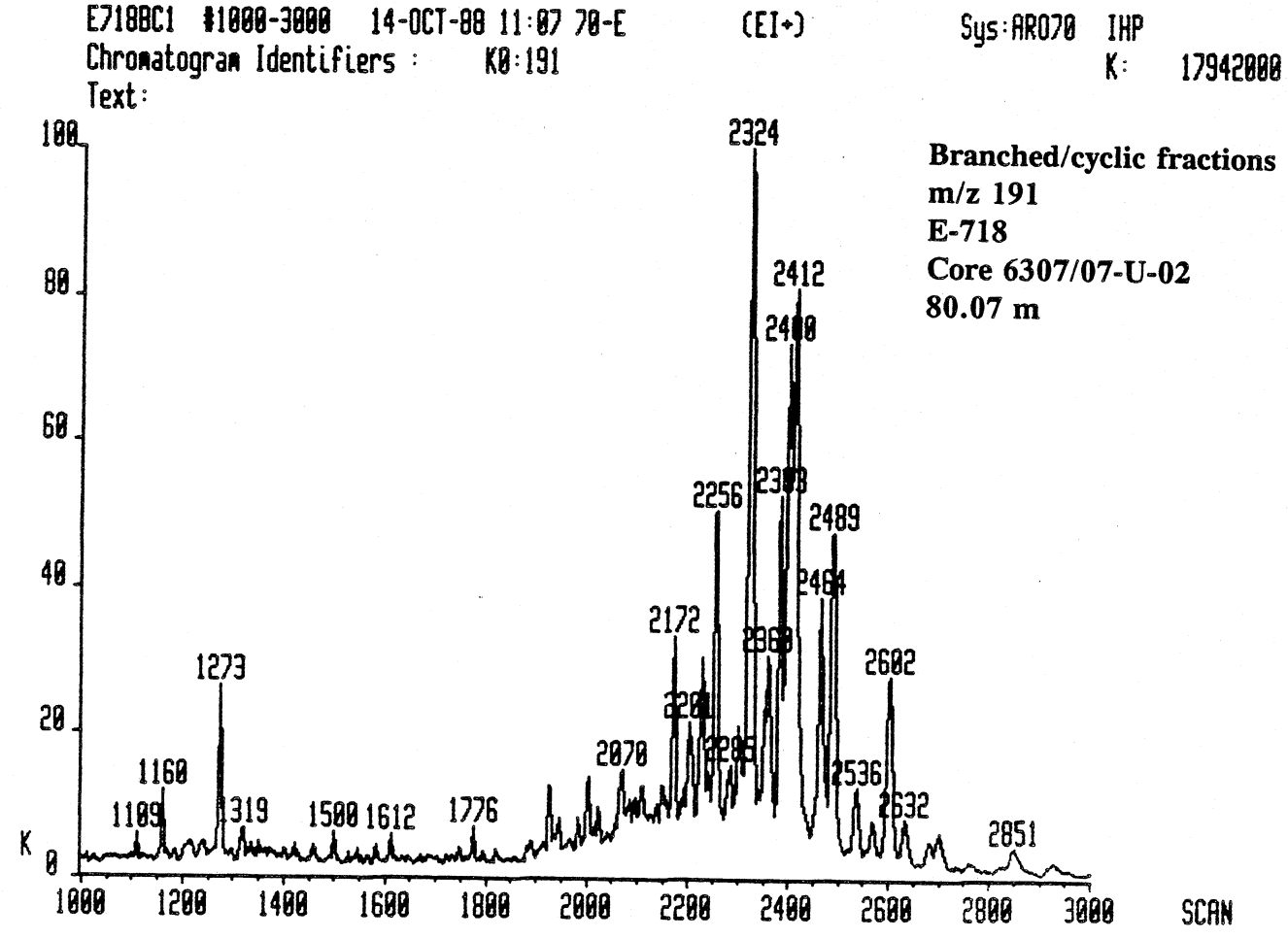




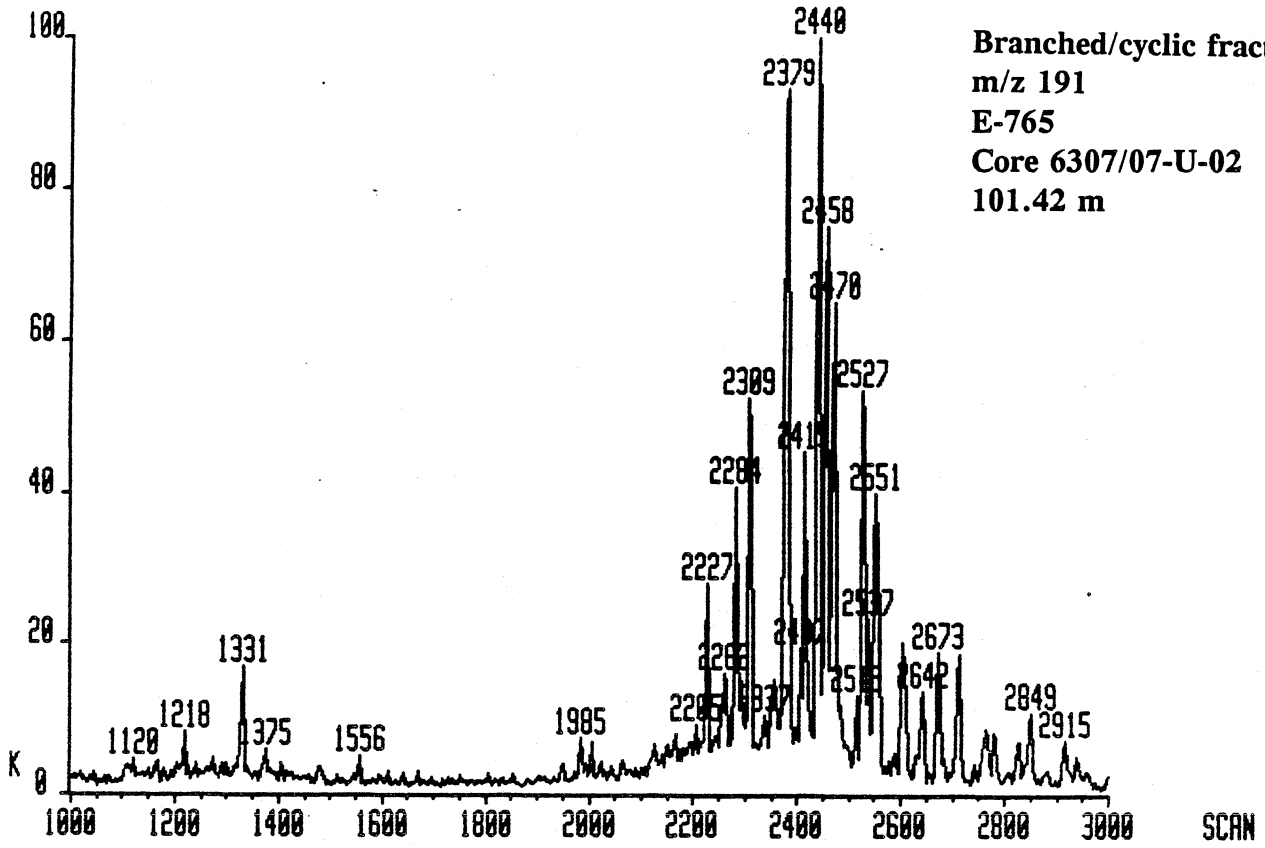

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Chromatogram Identifiers : K0:191 K: 38332000
Text:
Branched/cyclic fractions
m/z 191
E-619
Core 6307/07-U-02
34.83 m
2402
2479
2576
2333
2703
1355
2251
1241
1398
1581
1832
2012
2629
2810
SCAN


E632BC #1000-3000 28-OCT-88 10:50 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 39778000
Text:
2377 hopanes/hopenes
Branched/cyclic fractions
m/z 191
E-632
Core 6307/07-U-02
40.78 m
2456
2468
2310
2549
Tri-and tetracyclic
2227
2524
2674
1325
1211
1983
2124
2779
2937
SCAN


E6468C #1000-3000 14-OCT-88 14:27 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 9017000
Text:
Tri-and tetracyclic
Pentracyclic
Branched/cyclic fractions
m/z 191
E-646
Core 6307/07-U-02
47.56 m
SCAN
TIME


E718BC1 #1000-3000 14-OCT-88 11:07 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 17942000
Text:
Branched/cyclic fractions
m/z 191
E-718
Core 6307/07-U-02
80.07 m
SCAN

E765BC #1000-3000 26-OCT-88 08:20 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : K0:191 K: 35820000
Text:



Branched/cyclic fractions
m/z 191
E-765
Core 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.5c

GC-MS

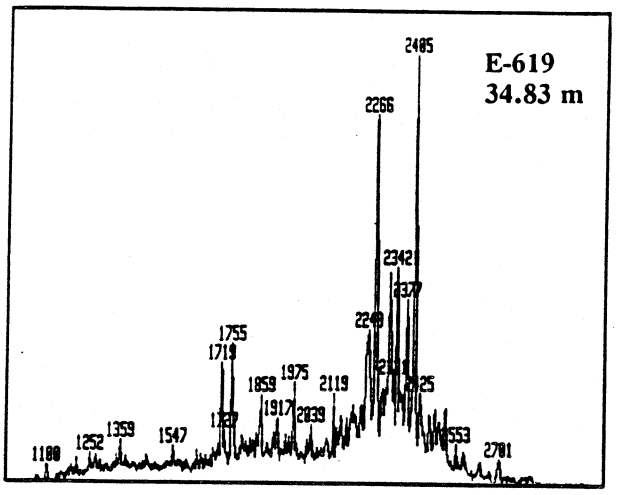
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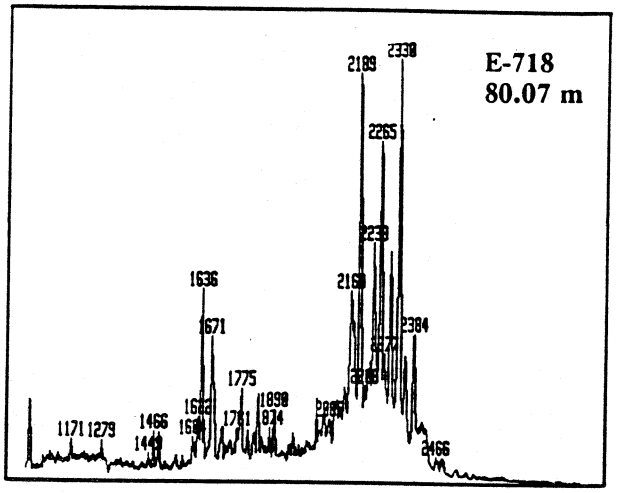
branched/cycloalkanes in extracts

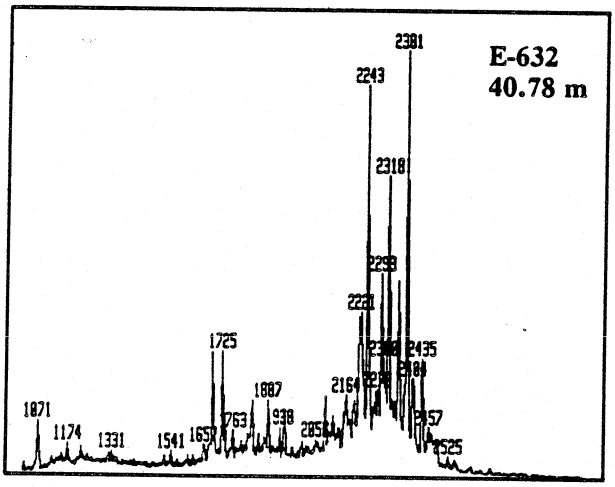
m/z 217

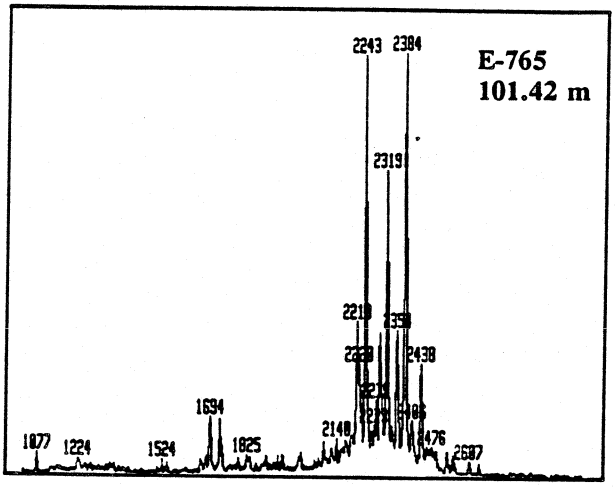
(Further identification of peaks, see section II)

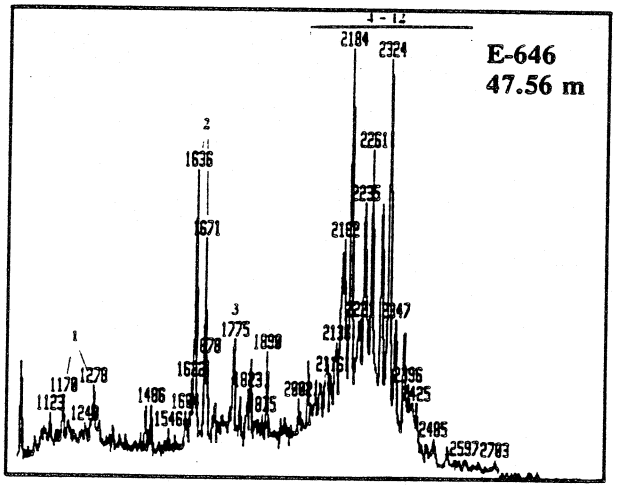
m/z 217 Steranes. Core 6307/07-U-02

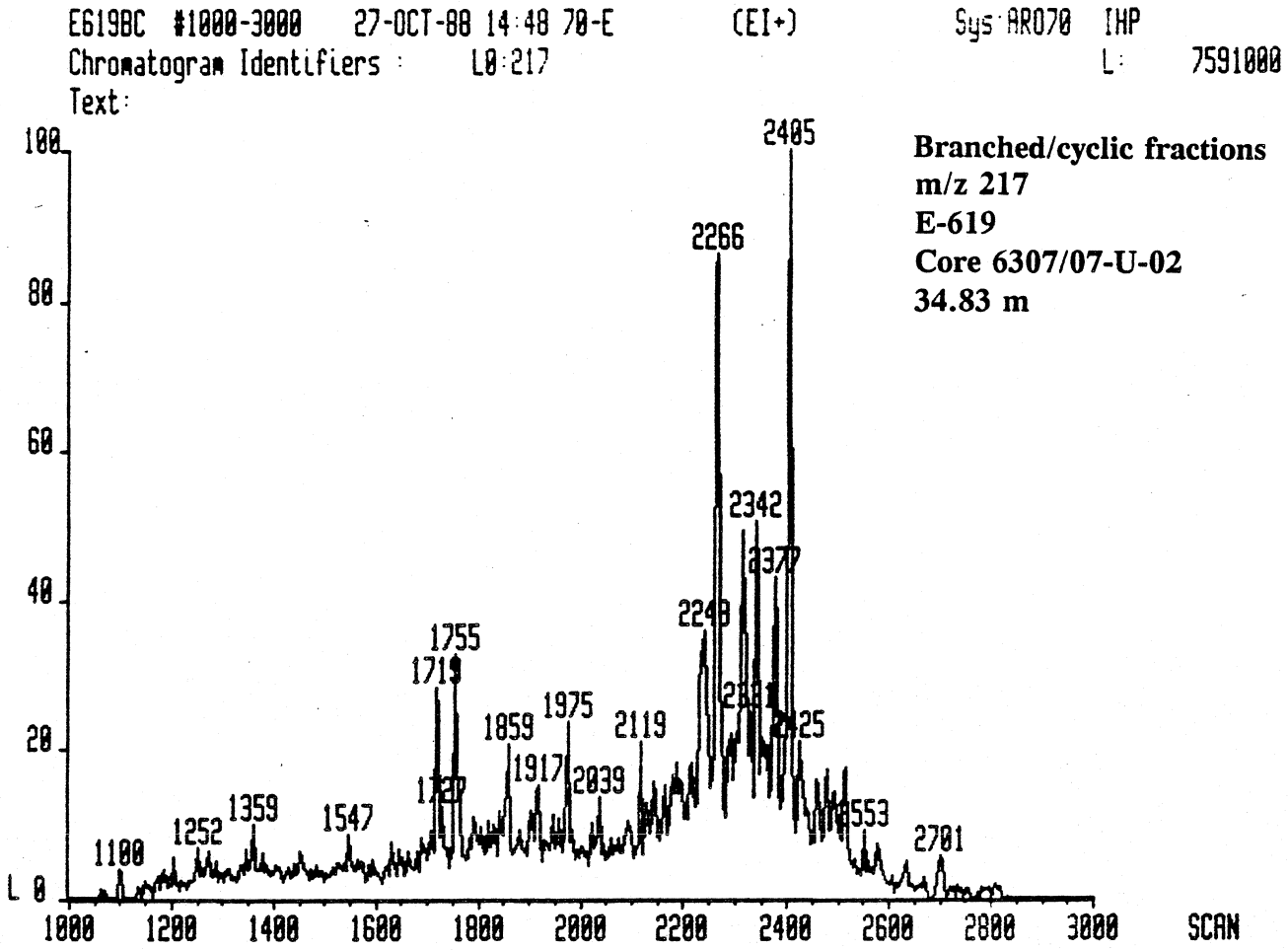




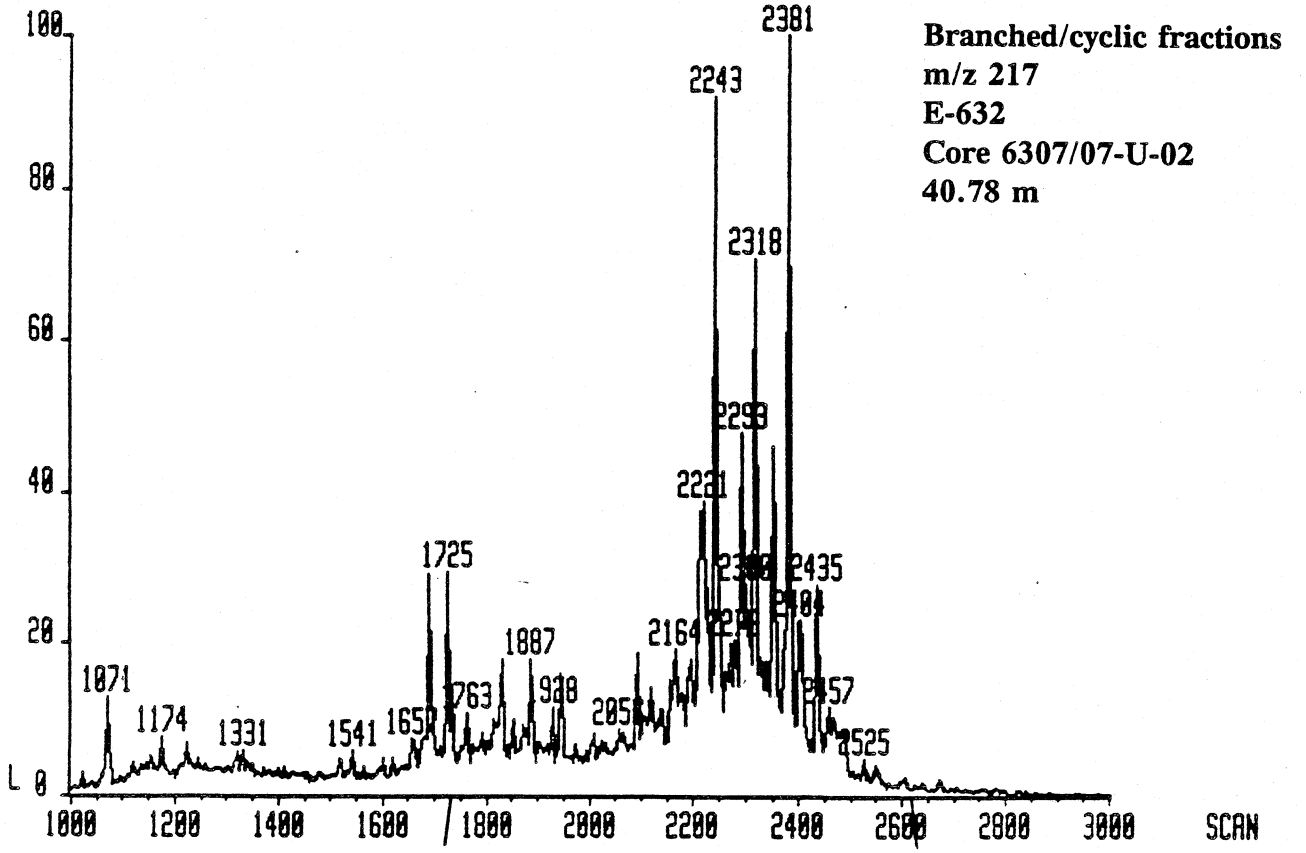




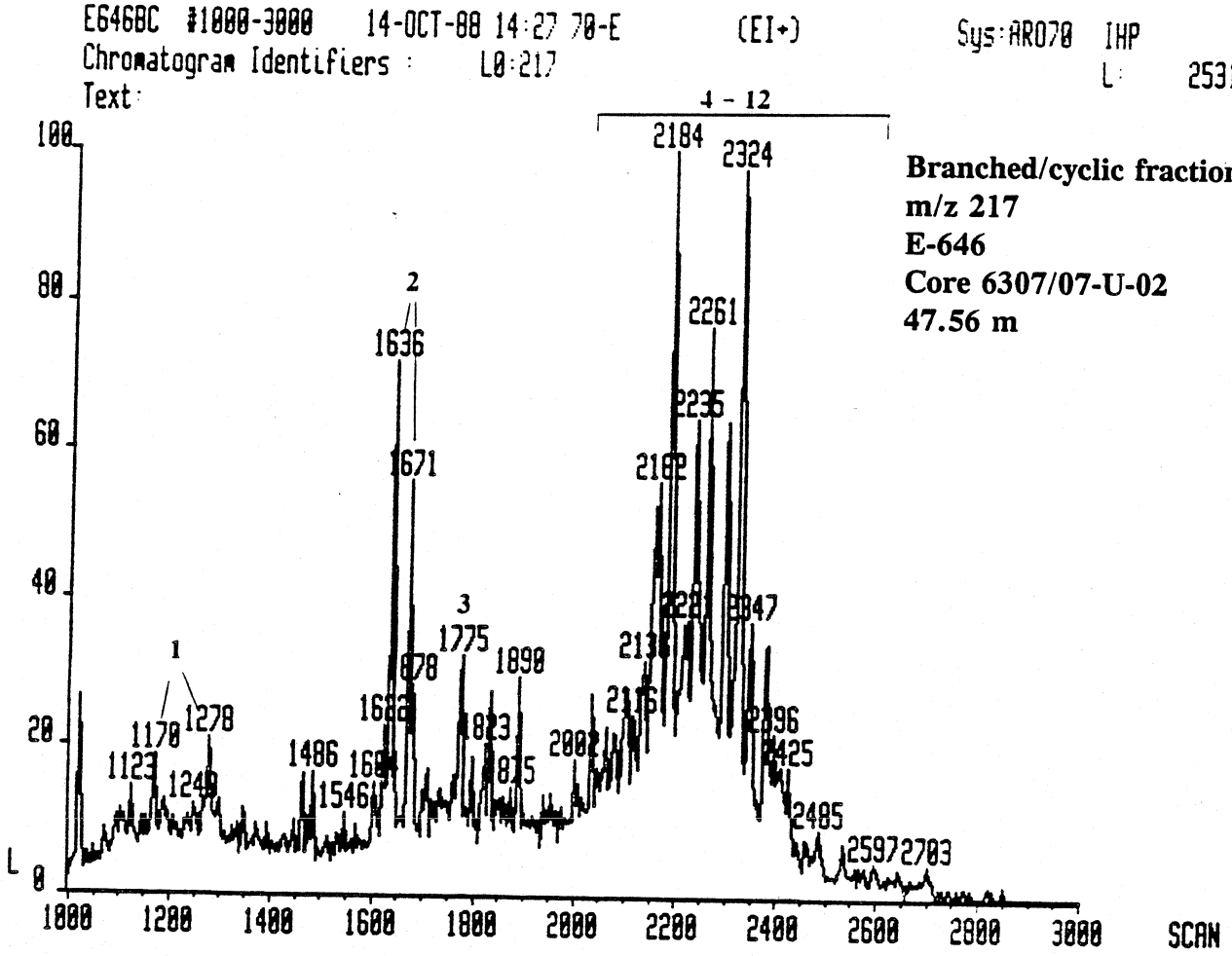




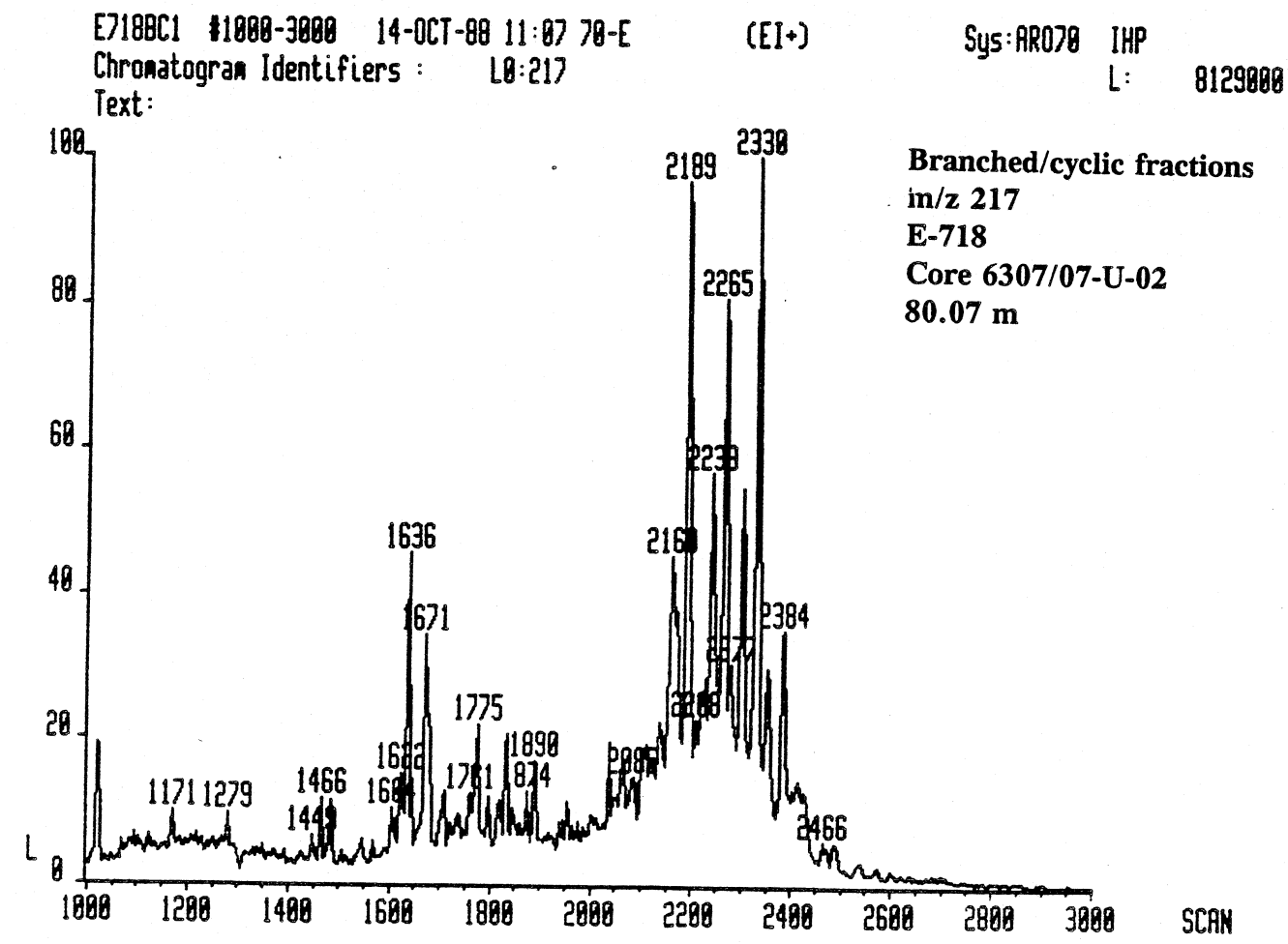
Branched/cyclic fractions
m/z 217
E-619
Core 6307/07-U-02
34.83 m



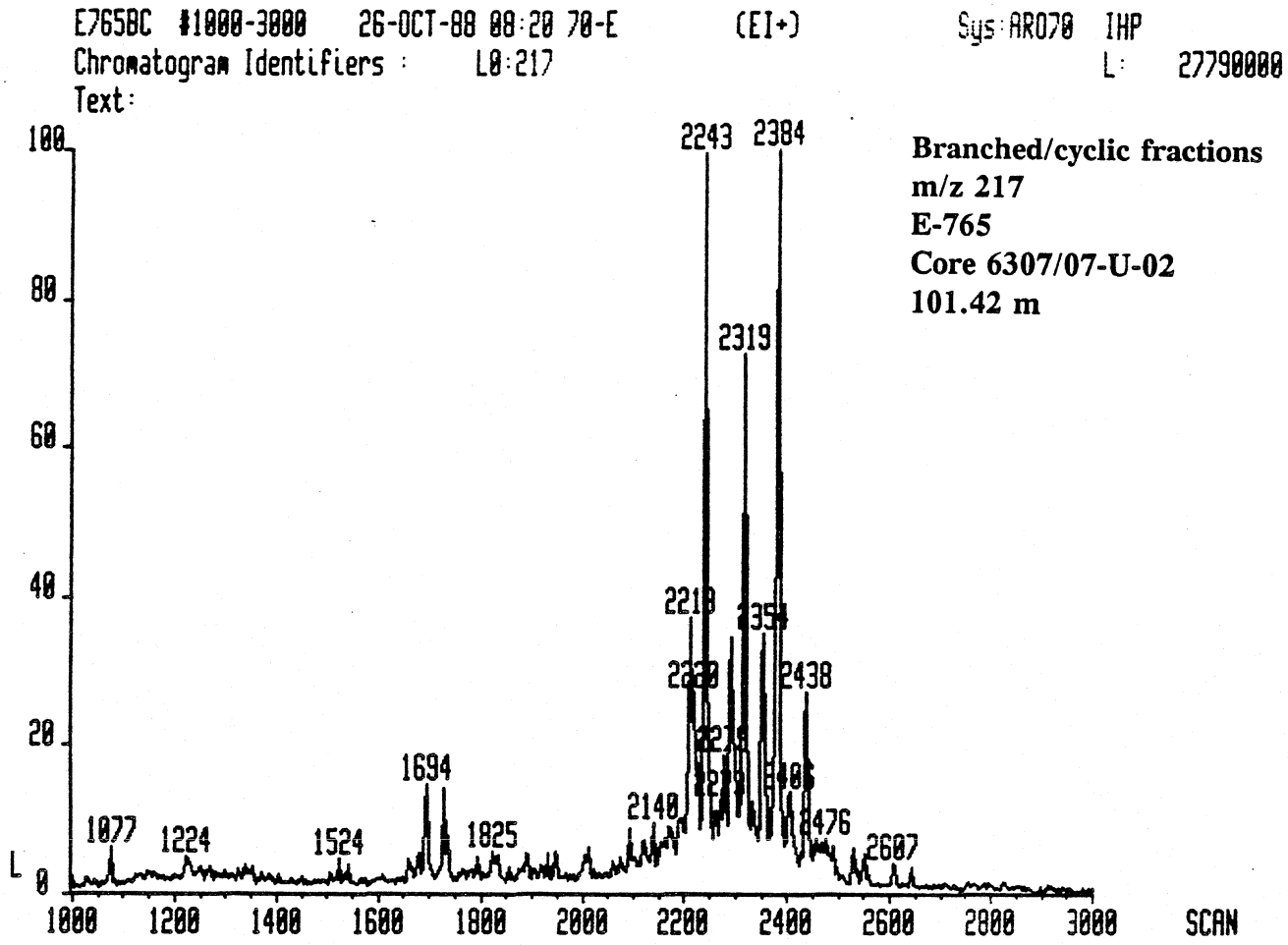
Branched/cyclic fractions
m/z 217
E-632
Core 6307/07-U-02
40.78 m



Branched/cyclic fractions
m/z 217
E-646
Core 6307/07-U-02
47.56 m



Branched/cyclic fractions
m/z 217
E-718
Core 6307/07-U-02
80.07 m



Branched/cyclic fractions
m/z 217
E-765
Core 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.5d

GC-MS

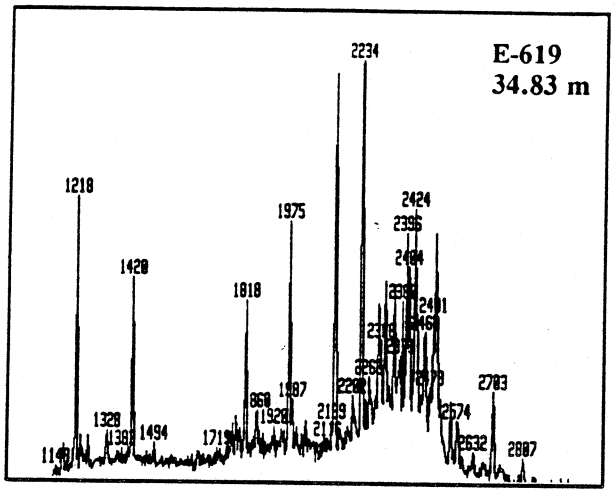
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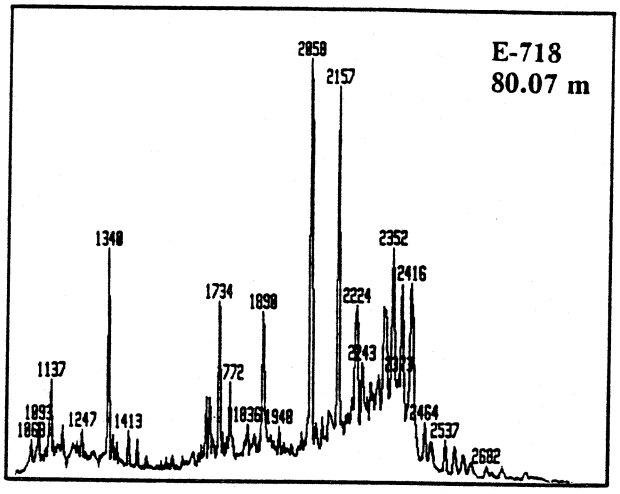
branched/cycloalkanes in extracts

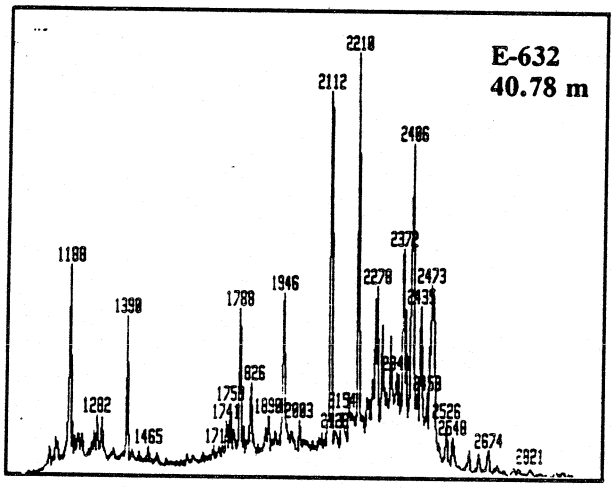
m/z 231

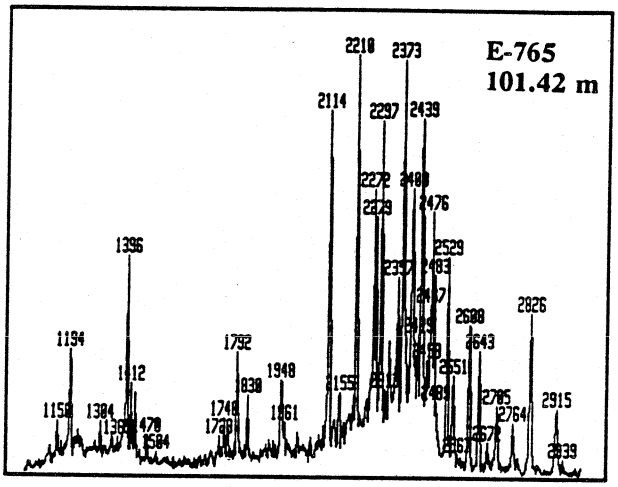
(Further identification of peaks, see section II)

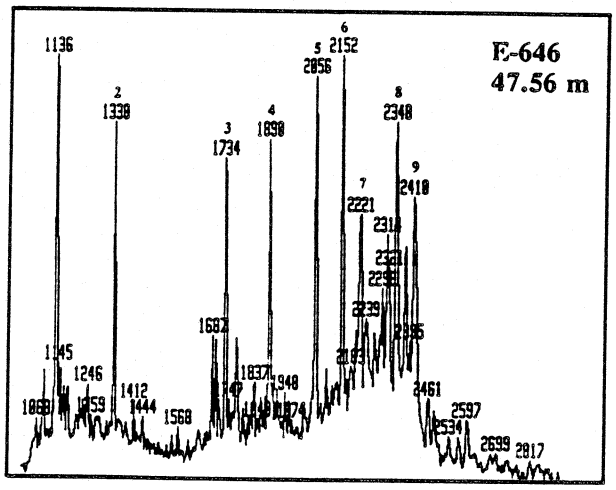
m/z 231 4-methyl steranes /$\Delta^{17(21)}$-hopenes. Core 6307/07-U-02

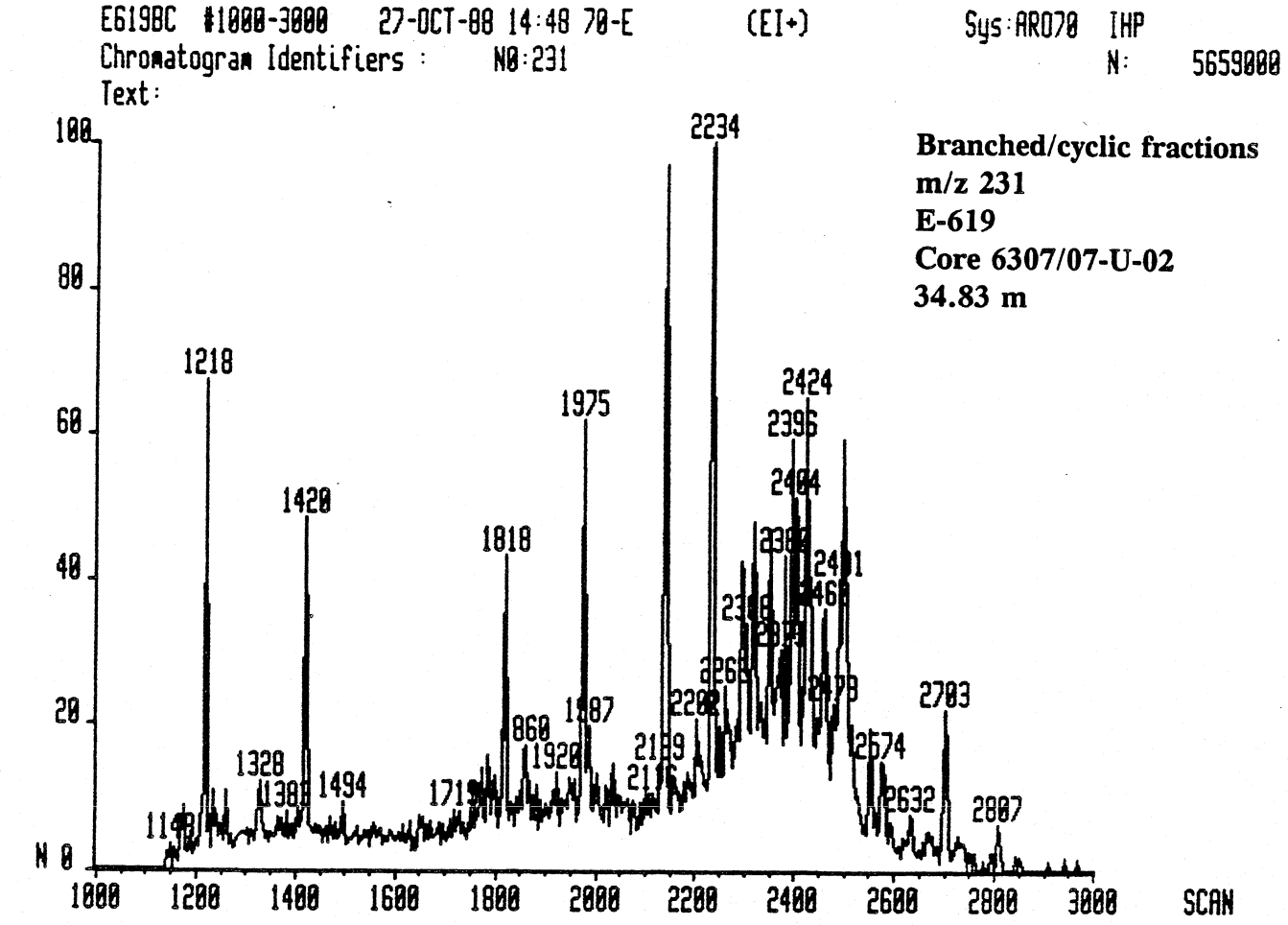


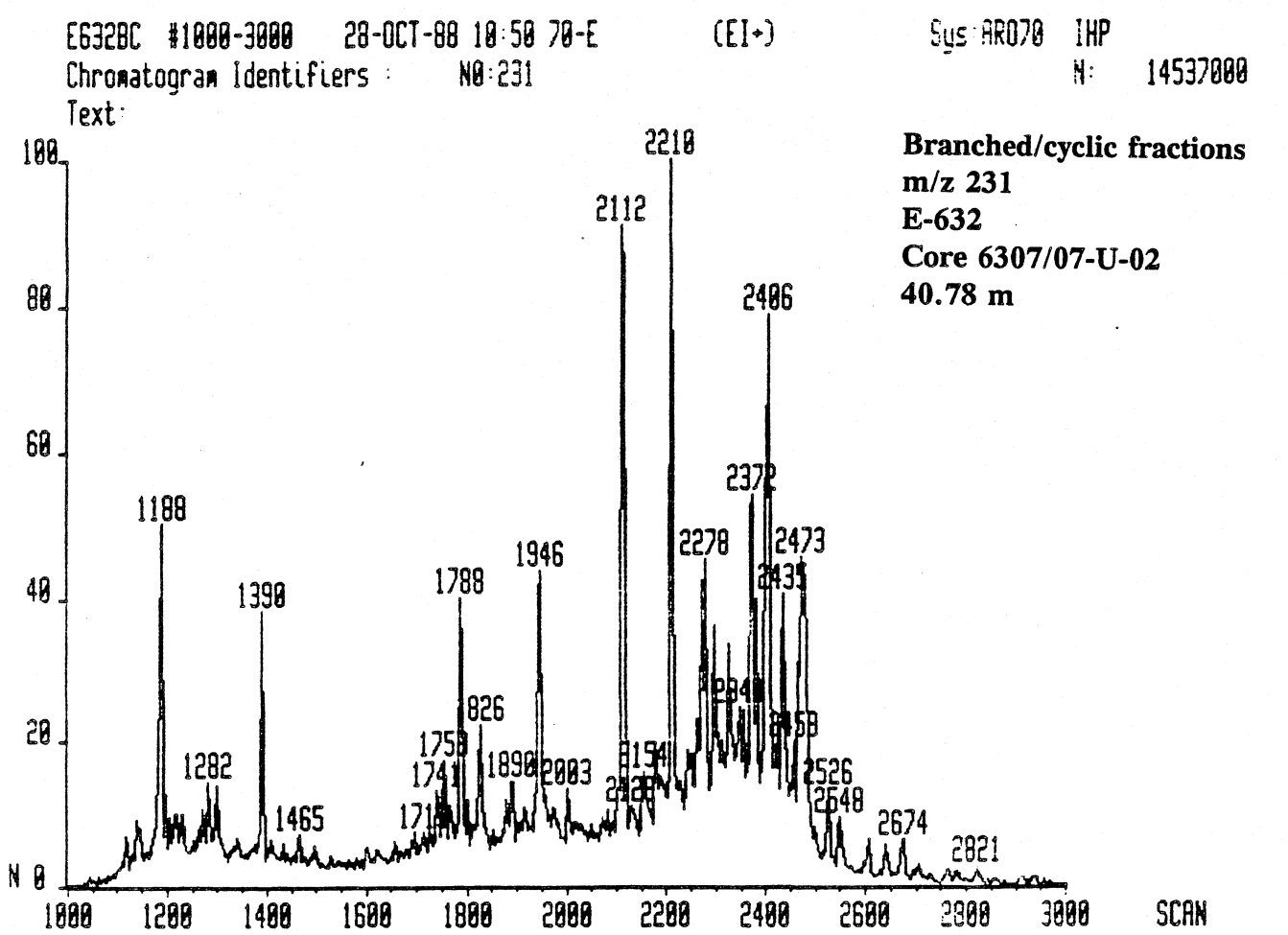


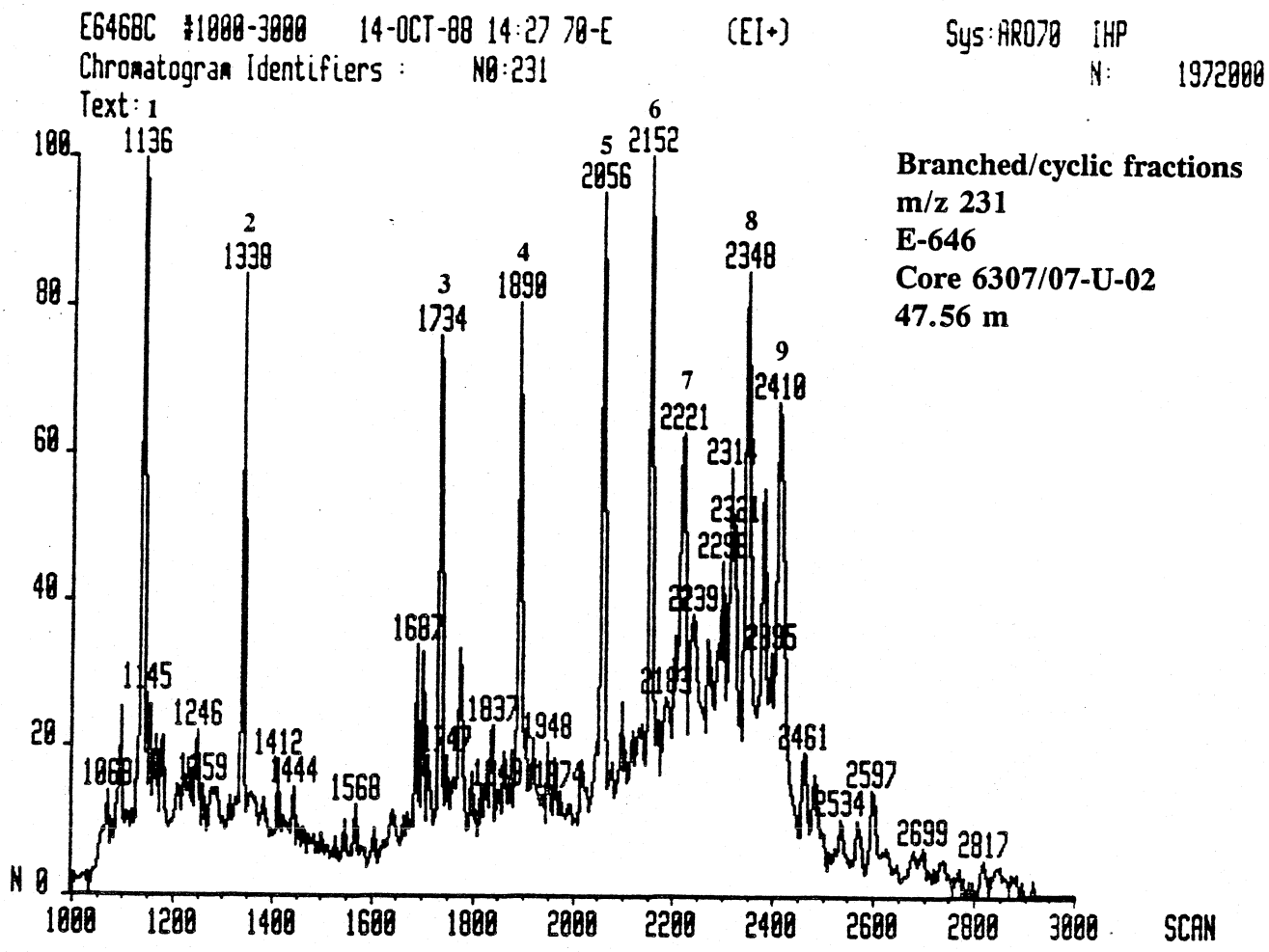




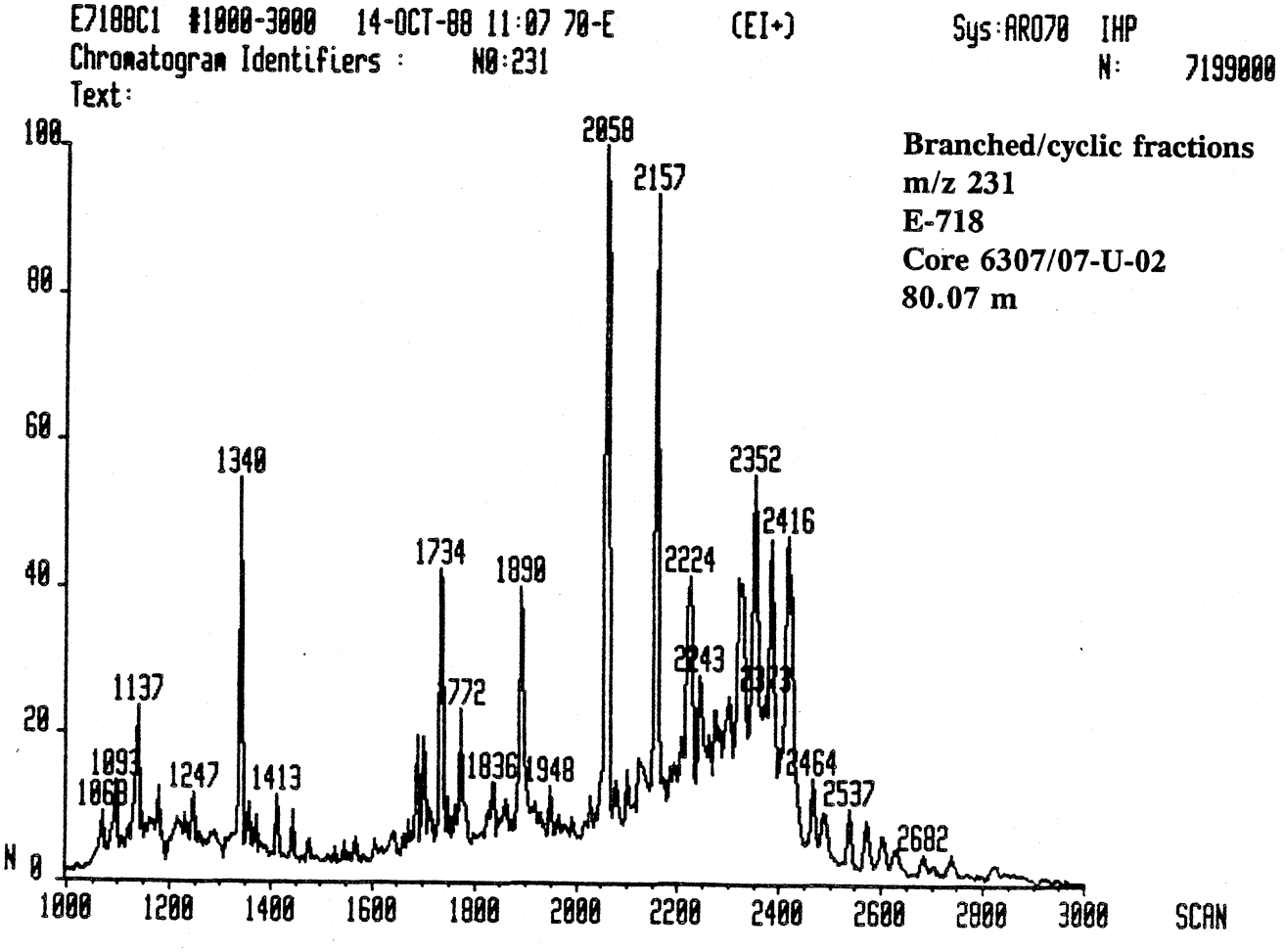



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Text:
Branched/cyclic fractions
m/z 231
E-619
Core 6307/07-U-02
34.83 m
SCAN


E6328C #1000-3000 28-OCT-88 10:50 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : N0:231 N: 14537000
Text:
Branched/cyclic fractions
m/z 231
E-632
Core 6307/07-U-02
40.78 m
SCAN

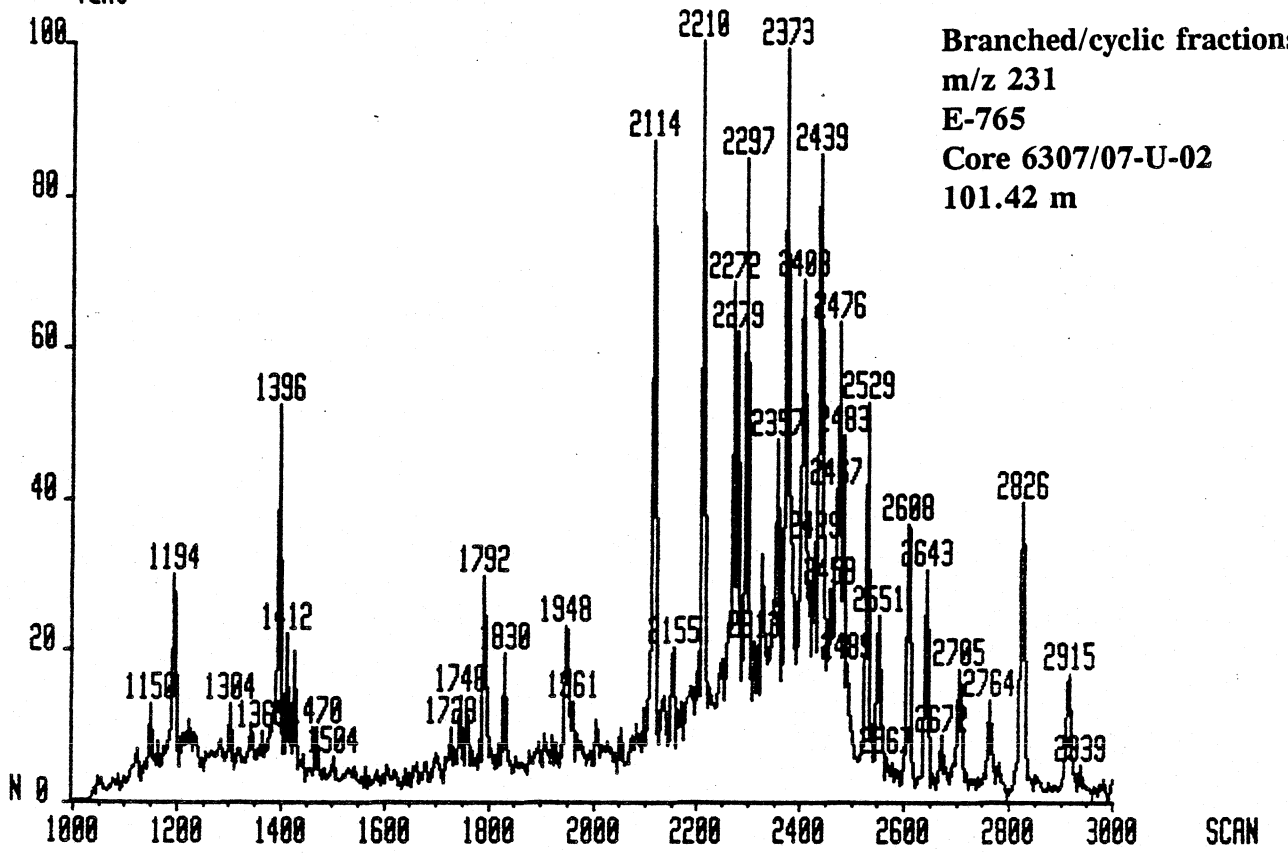


Branched/cyclic fractions
m/z 231
E-646
Core 6307/07-U-02
47.56 m



Branched/cyclic fractions
m/z 231
E-718
Core 6307/07-U-02
80.07 m

E765BC #1000-3000 26-OCT-88 08:20 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : N0:231 N: 10377000
Text:



Branched/cyclic fractions
m/z 231
E-765
Core 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.5e

GC-MS

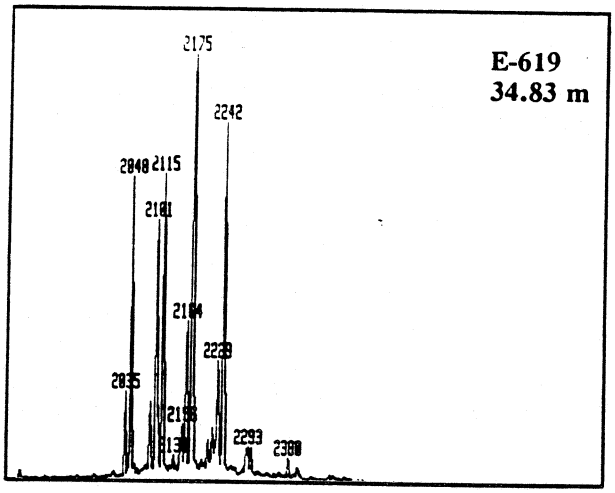
of

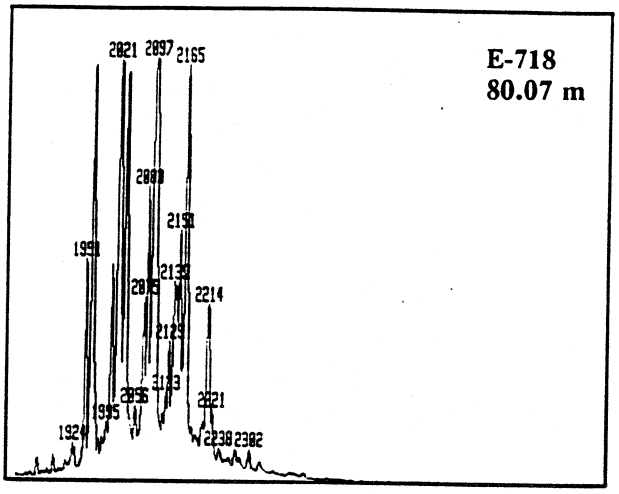
branched/cycloalkanes in extracts

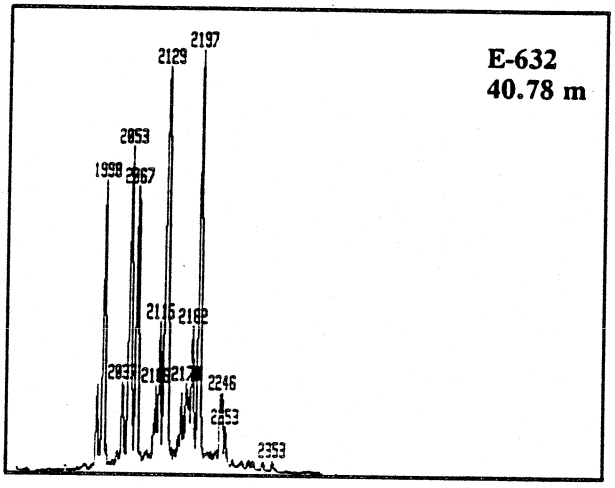
m/z 257

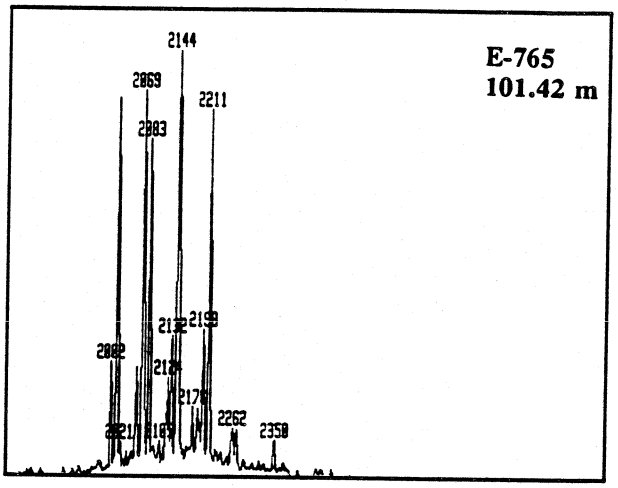
(Further identification of peaks, see section II)

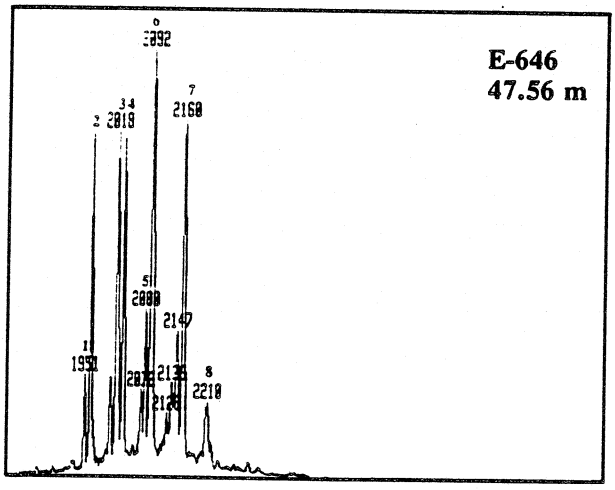
m/z 257 Rearranged sterenes. Core 6307/07-U-02

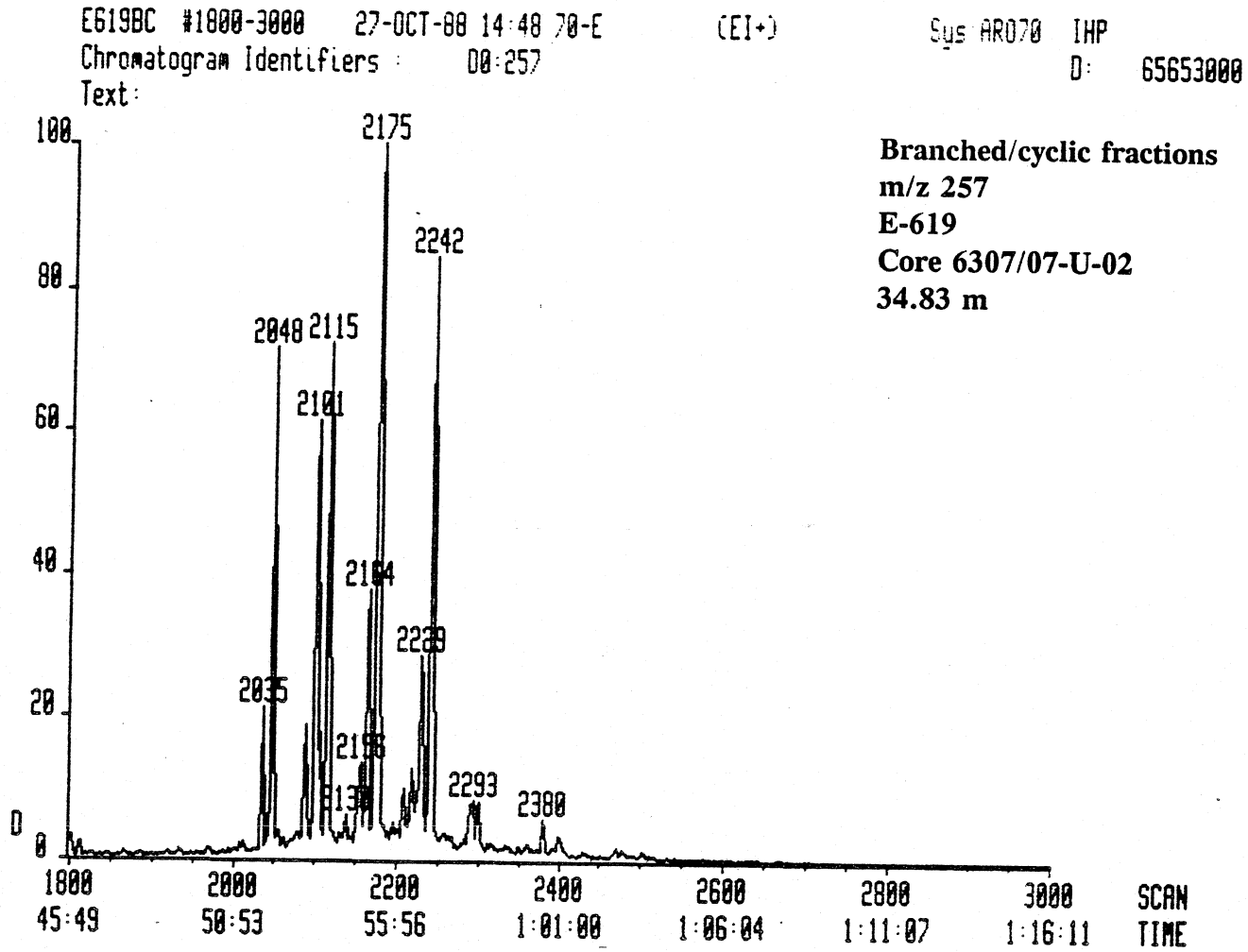




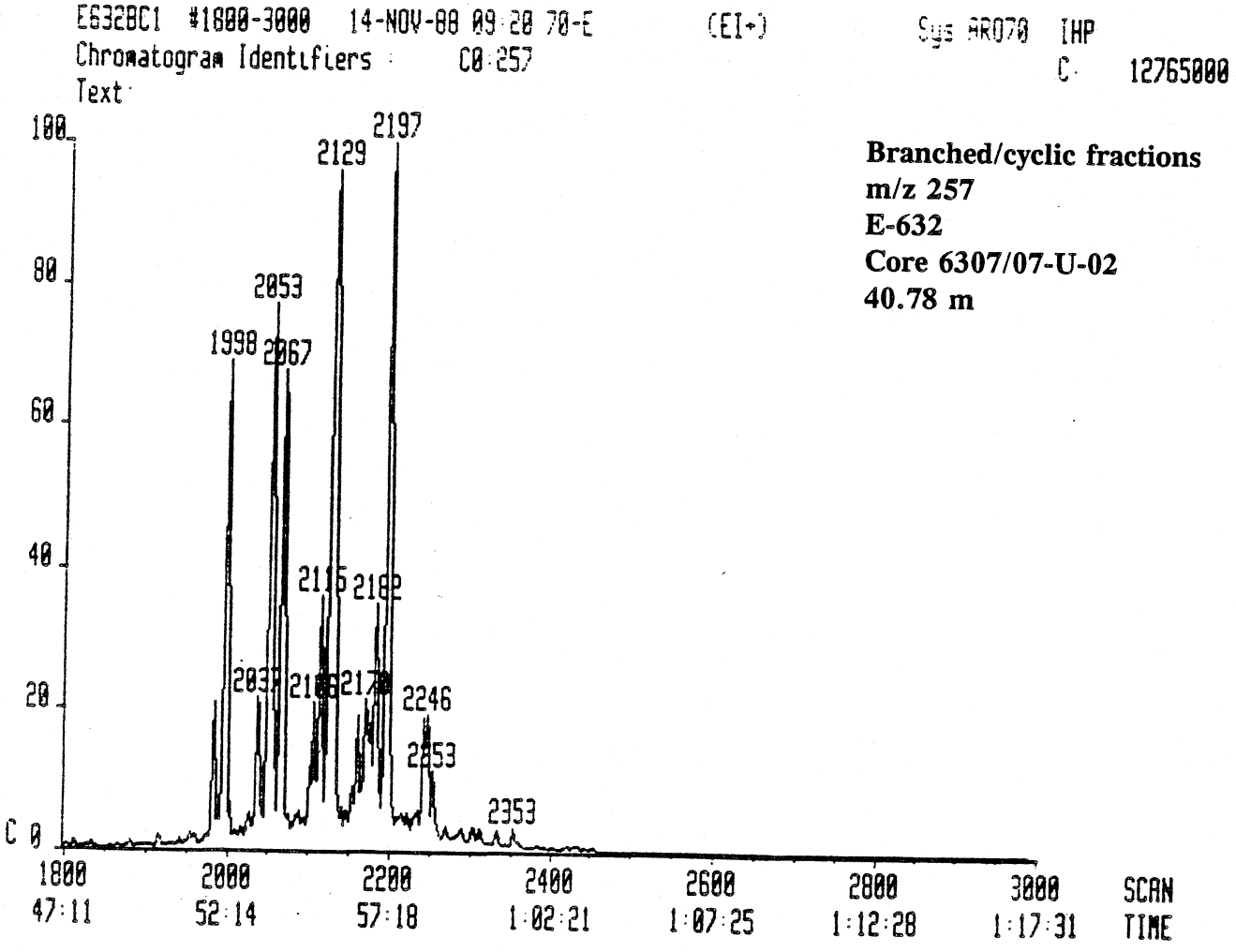




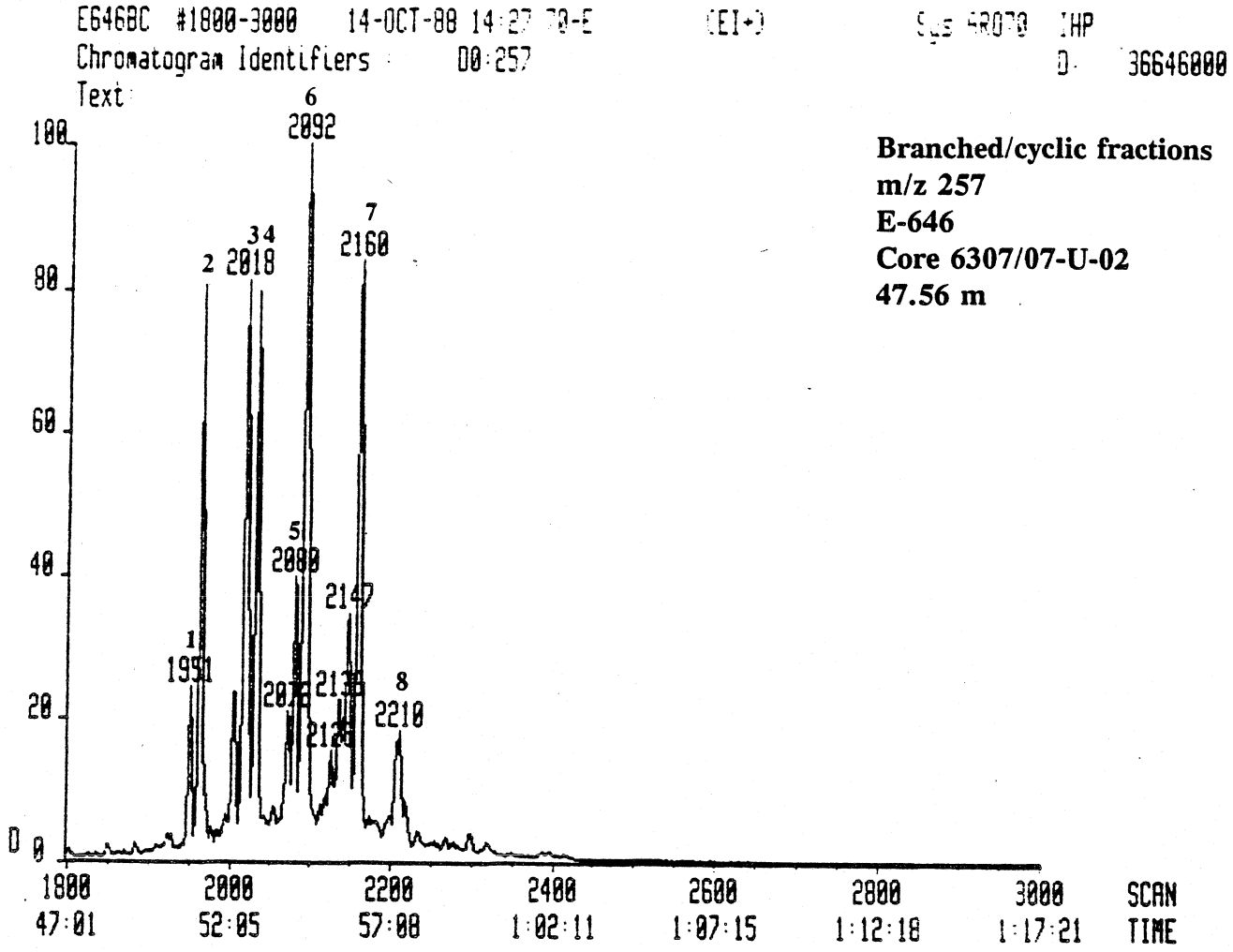




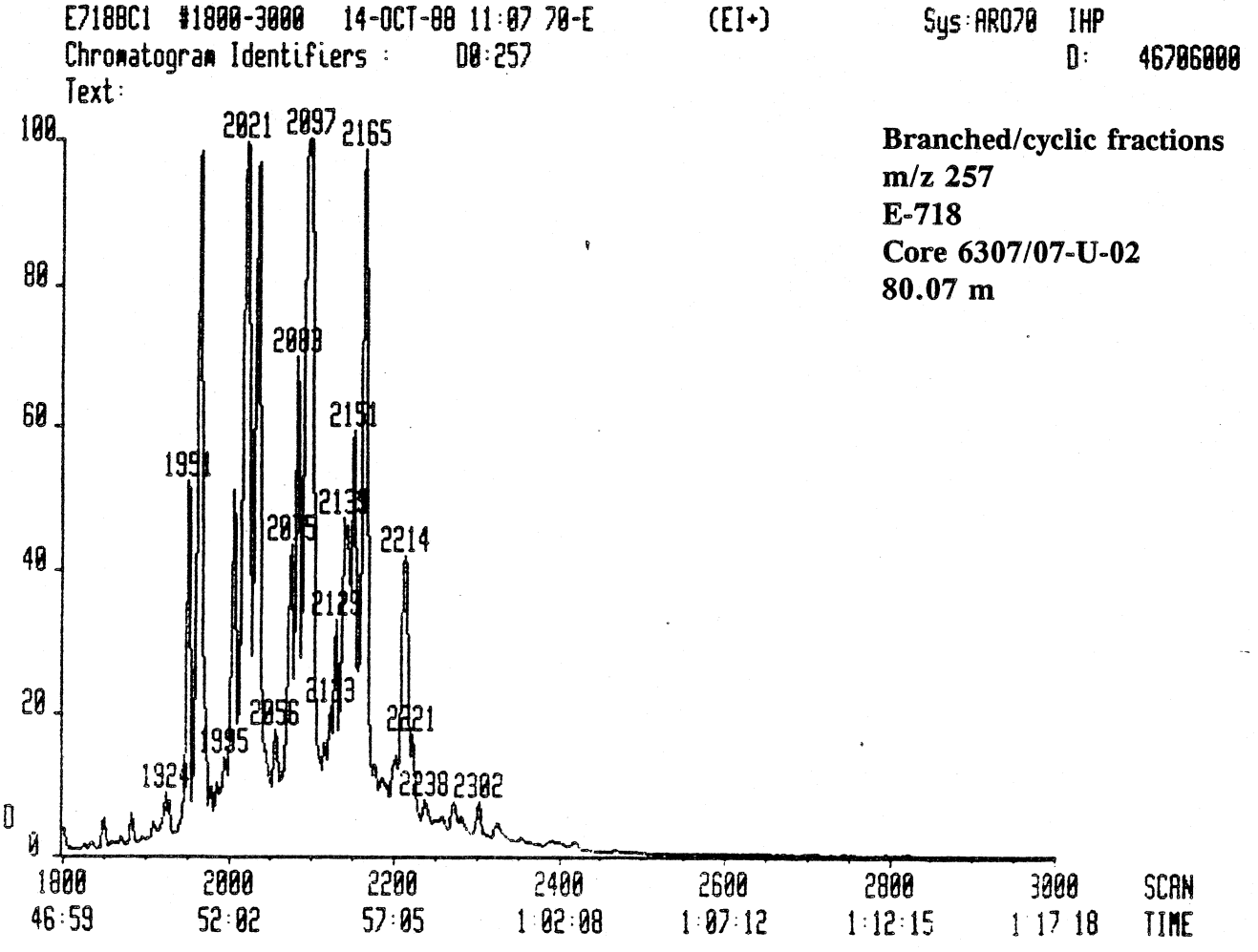
Branched/cyclic fractions
m/z 257
E-619
Core 6307/07-U-02
34.83 m



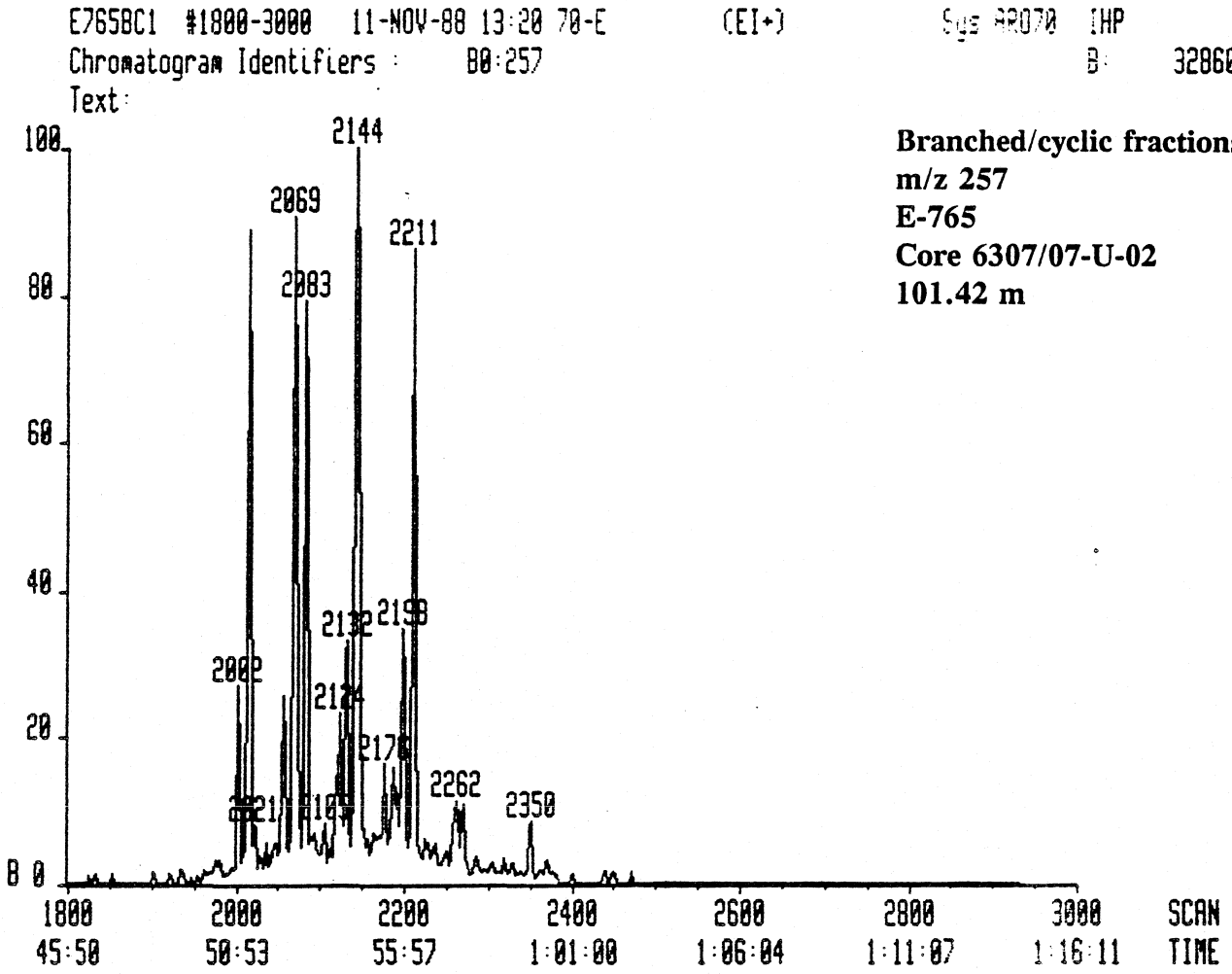
Branched/cyclic fractions
m/z 257
E-632
Core 6307/07-U-02
40.78 m



Branched/cyclic fractions
m/z 257
E-646
Core 6307/07-U-02
47.56 m



Branched/cyclic fractions
m/z 257
E-718
Core 6307/07-U-02
80.07 m



Branched/cyclic fractions
m/z 257
E-765
Core 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.5f

GC-MS

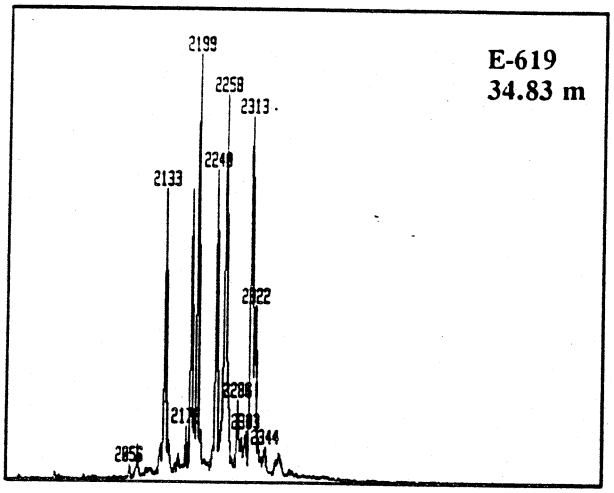
of

branched/cycloalkanes in extracts

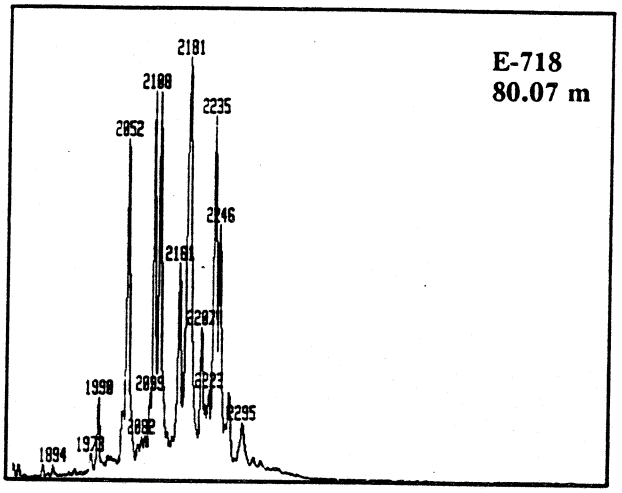
m/z 271

(Further identification of peaks, see section II)

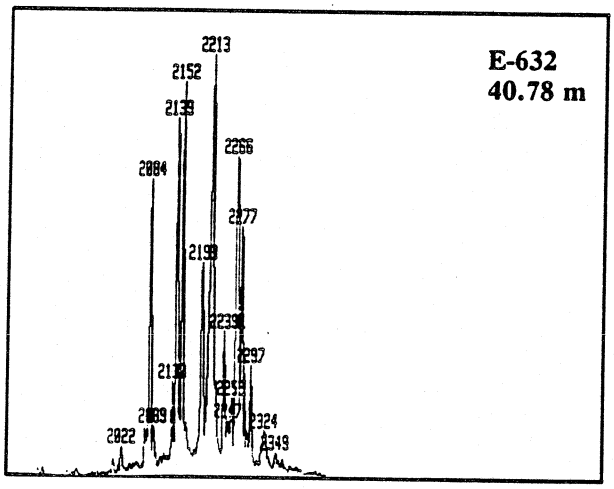
m/z 271 Rearranged sterenes with nuclear methyl group ?. Core 6307/07-U-02



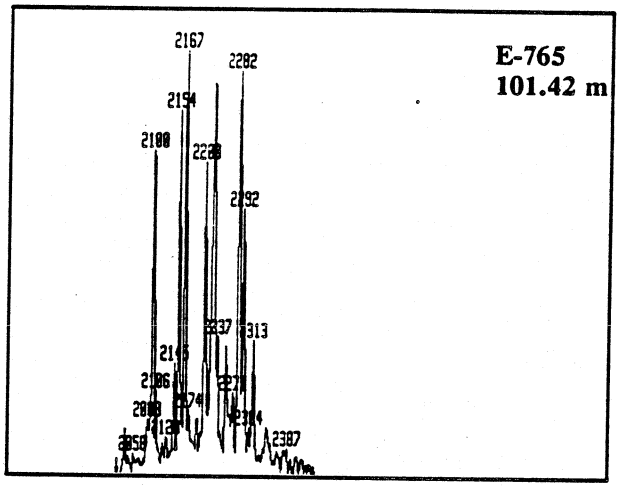
E-619
34.83 m



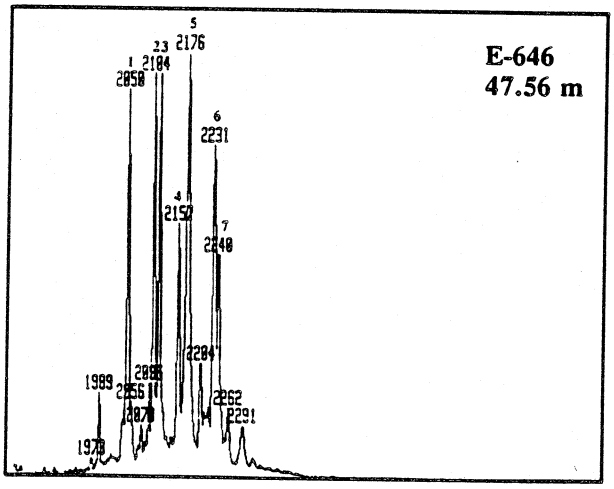
E-718
80.78 m



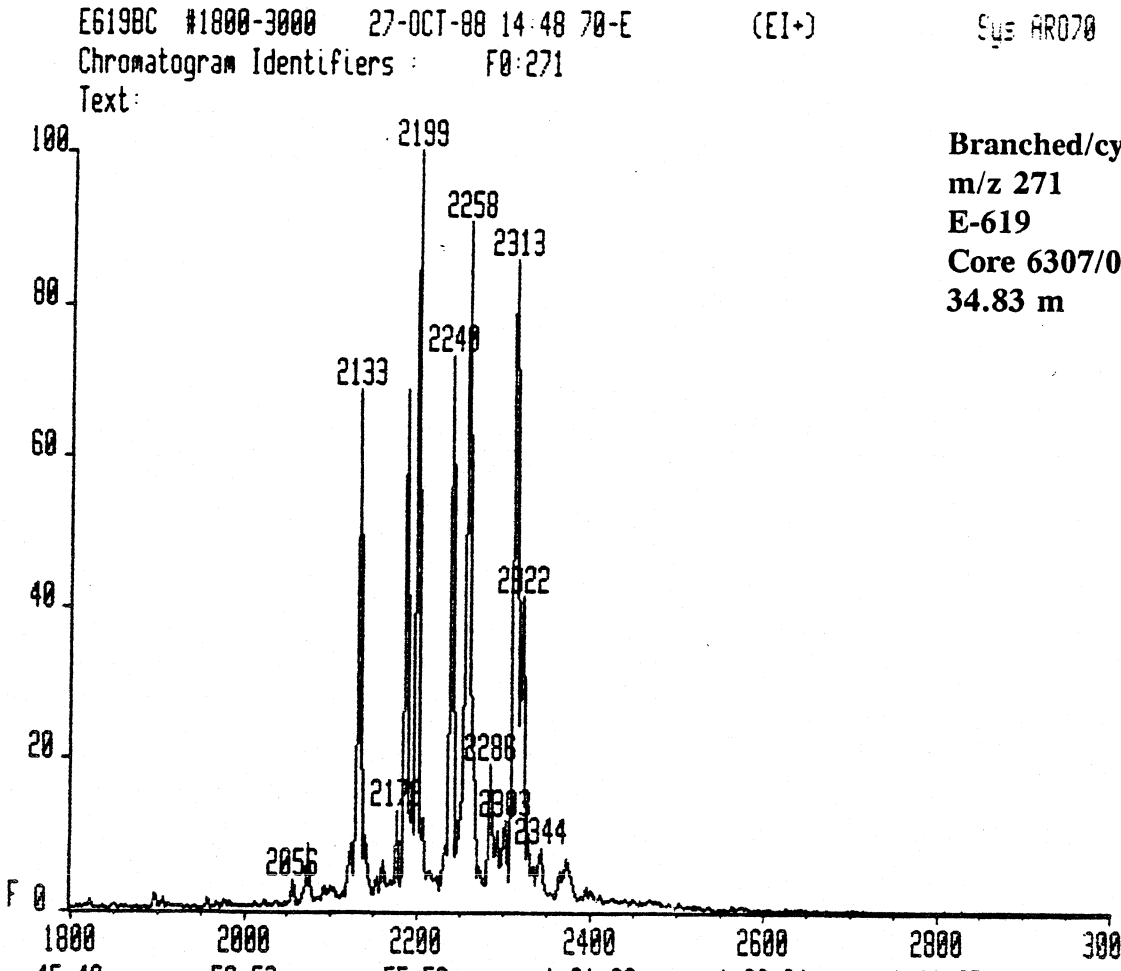
E-632
40.78 m



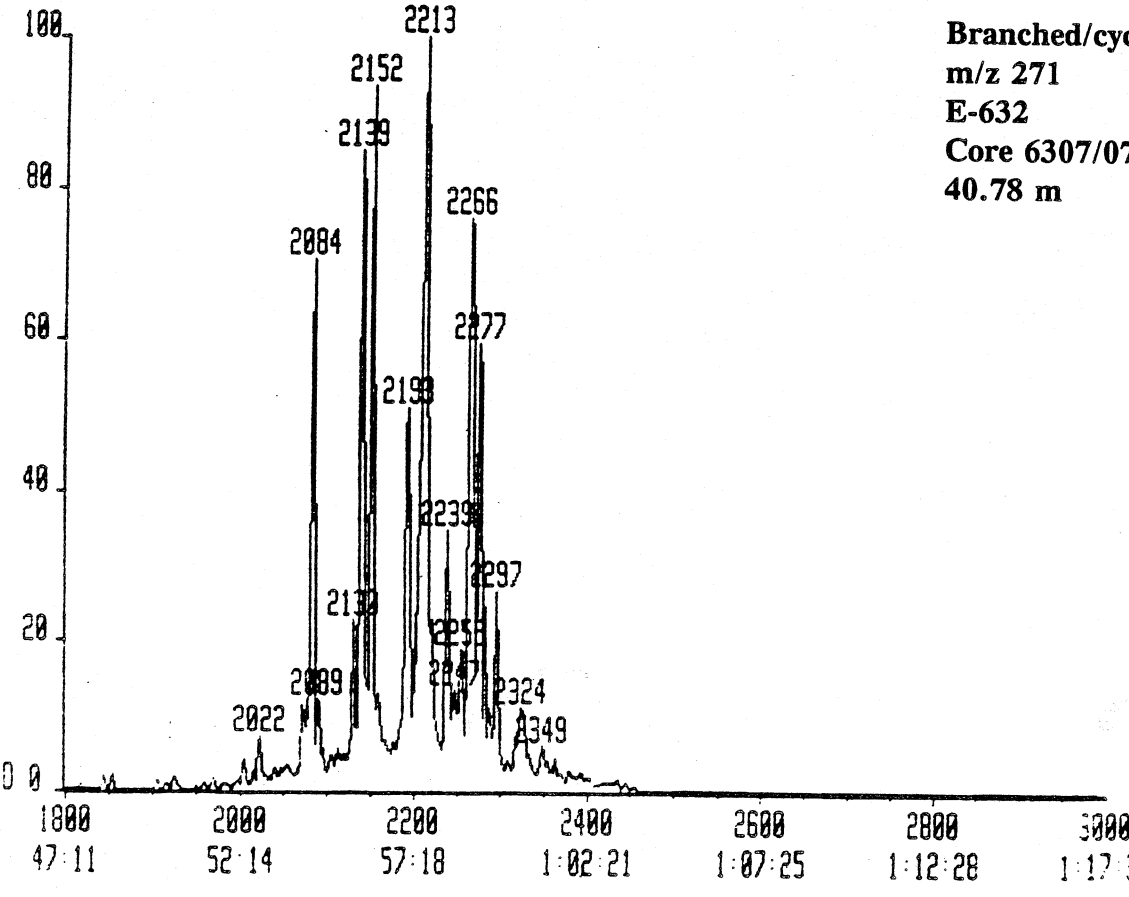
E-765
101.42 m



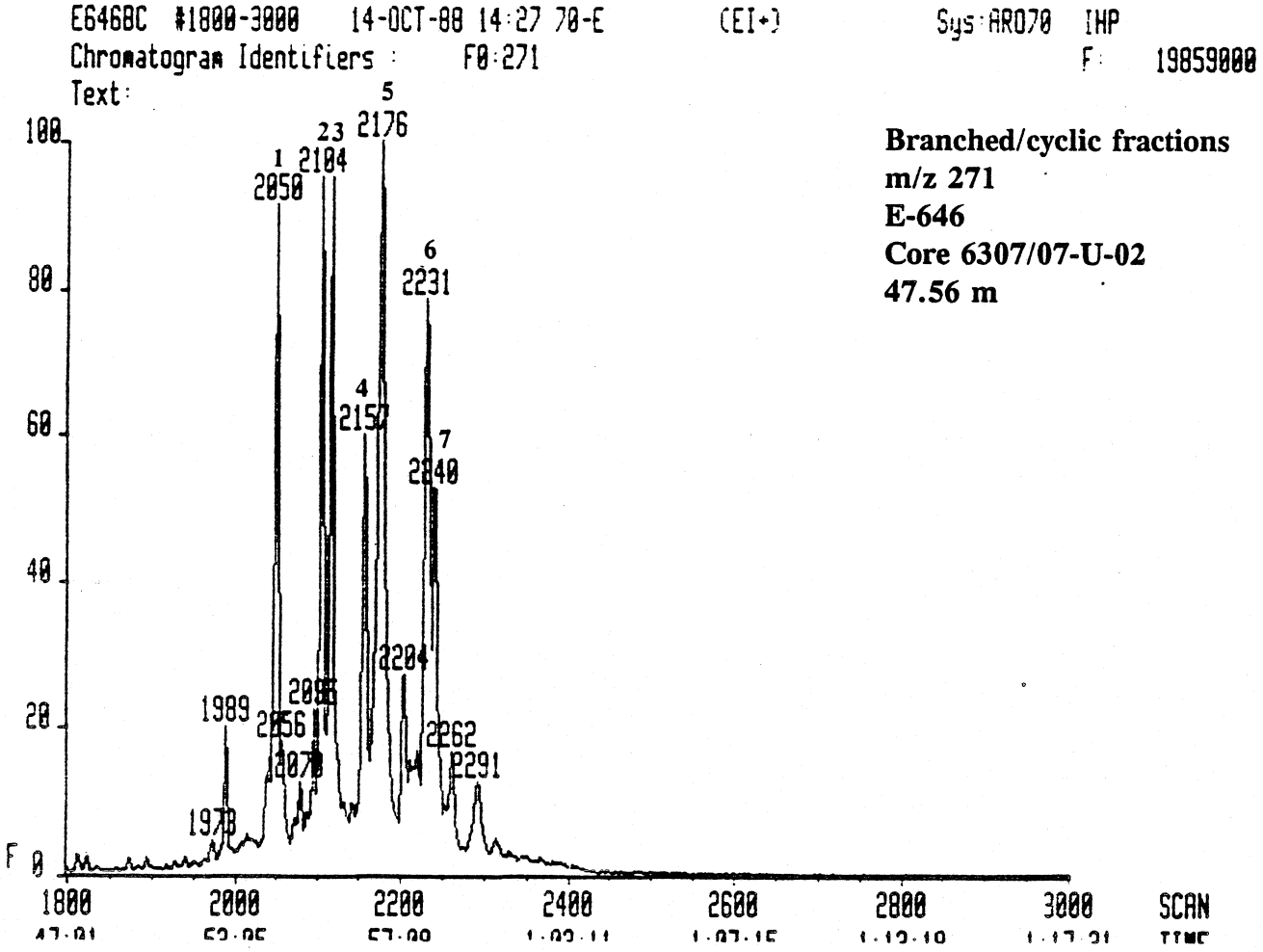
E-646
47.56 m



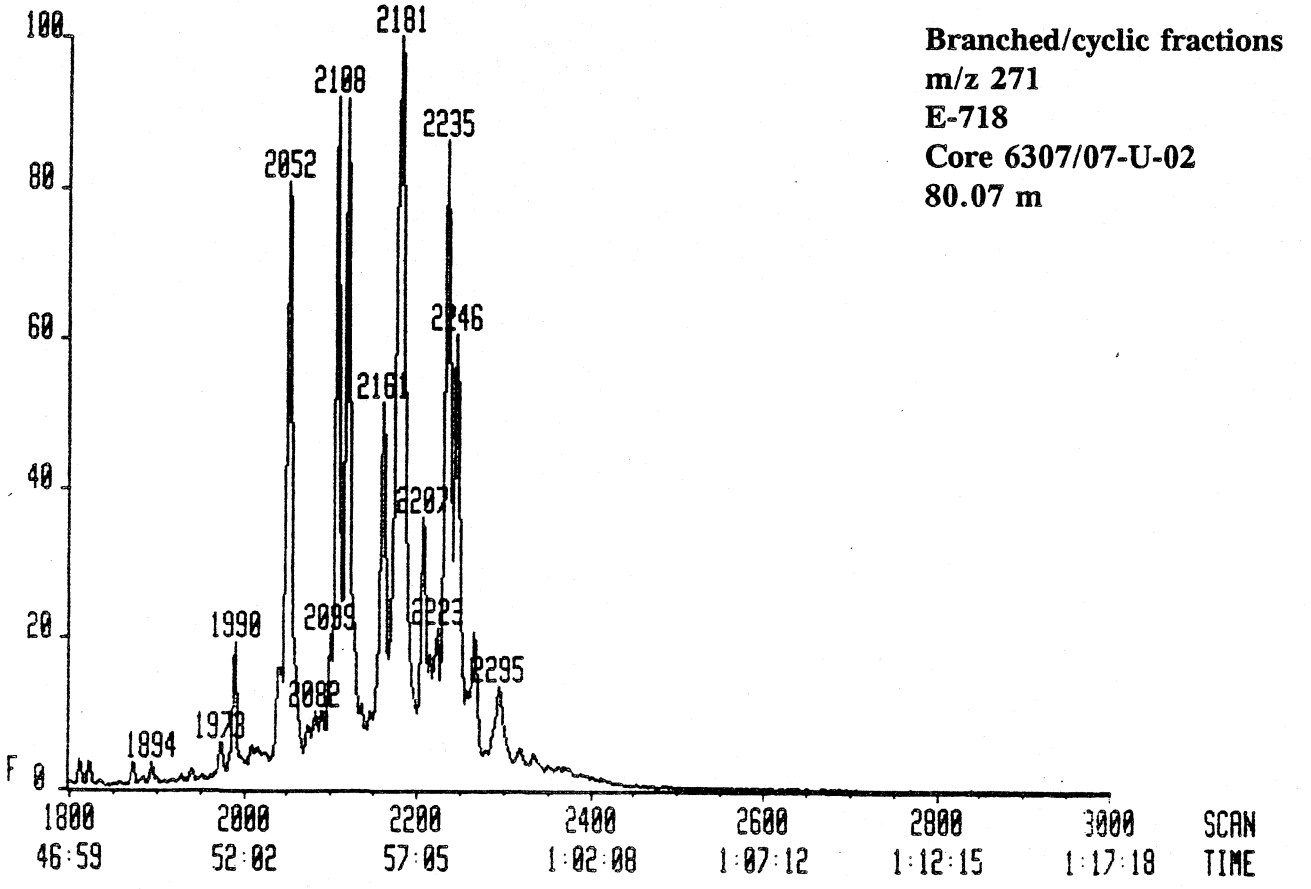
Branched/cyclic fractions
m/z 271
E-619
Core 6307/07-U-02
34.83 m



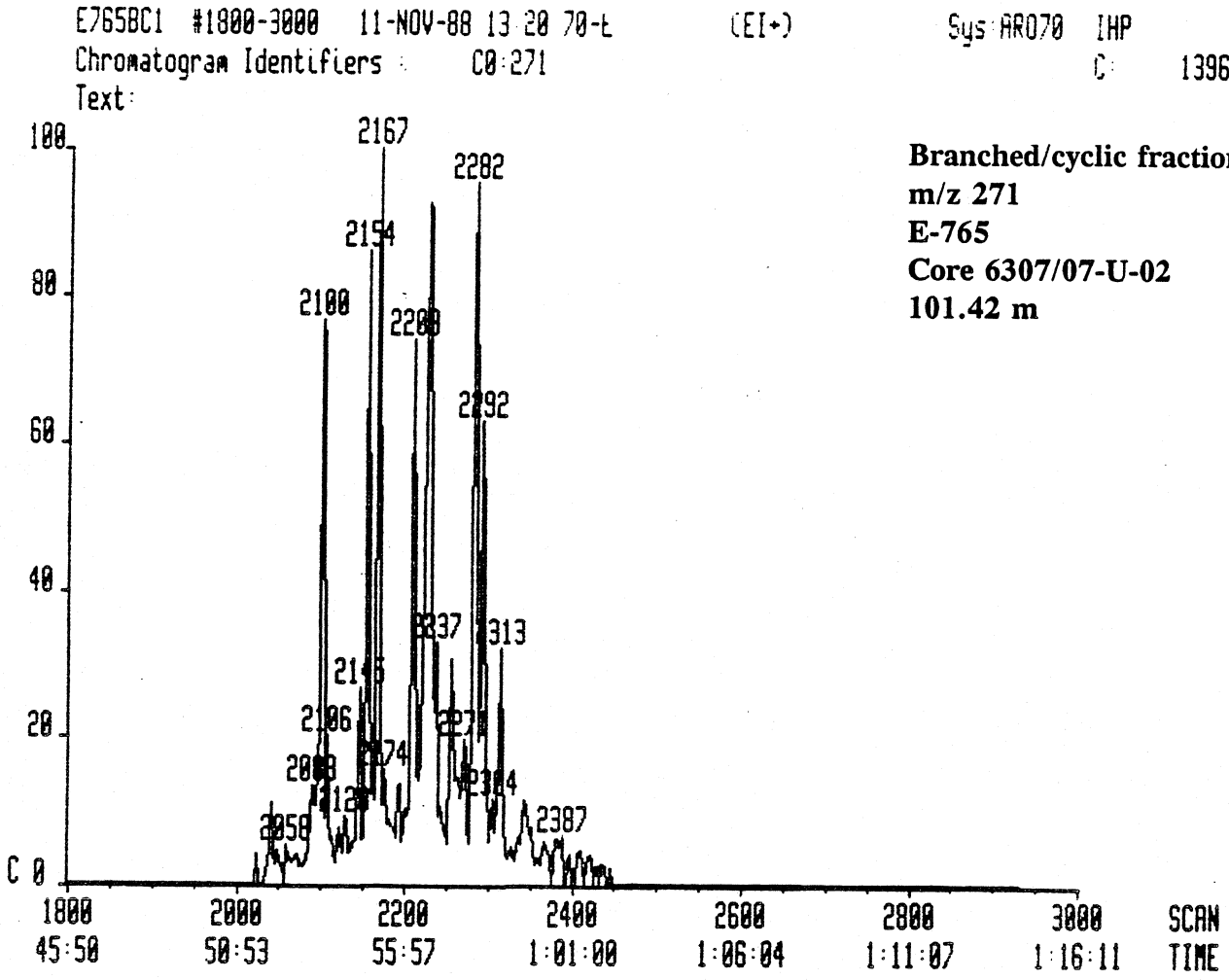
Branched/cyclic fractions
m/z 271
E-632
Core 6307/07-U-02
40.78 m



Branched/cyclic fractions
m/z 271
E-646
Core 6307/07-U-02
47.56 m



Branched/cyclic fractions
m/z 271
E-718
Core 6307/07-U-02
80.07 m



Branched/cyclic fractions
m/z 271
E-765
Core 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.6a

PY-GC-MS

of

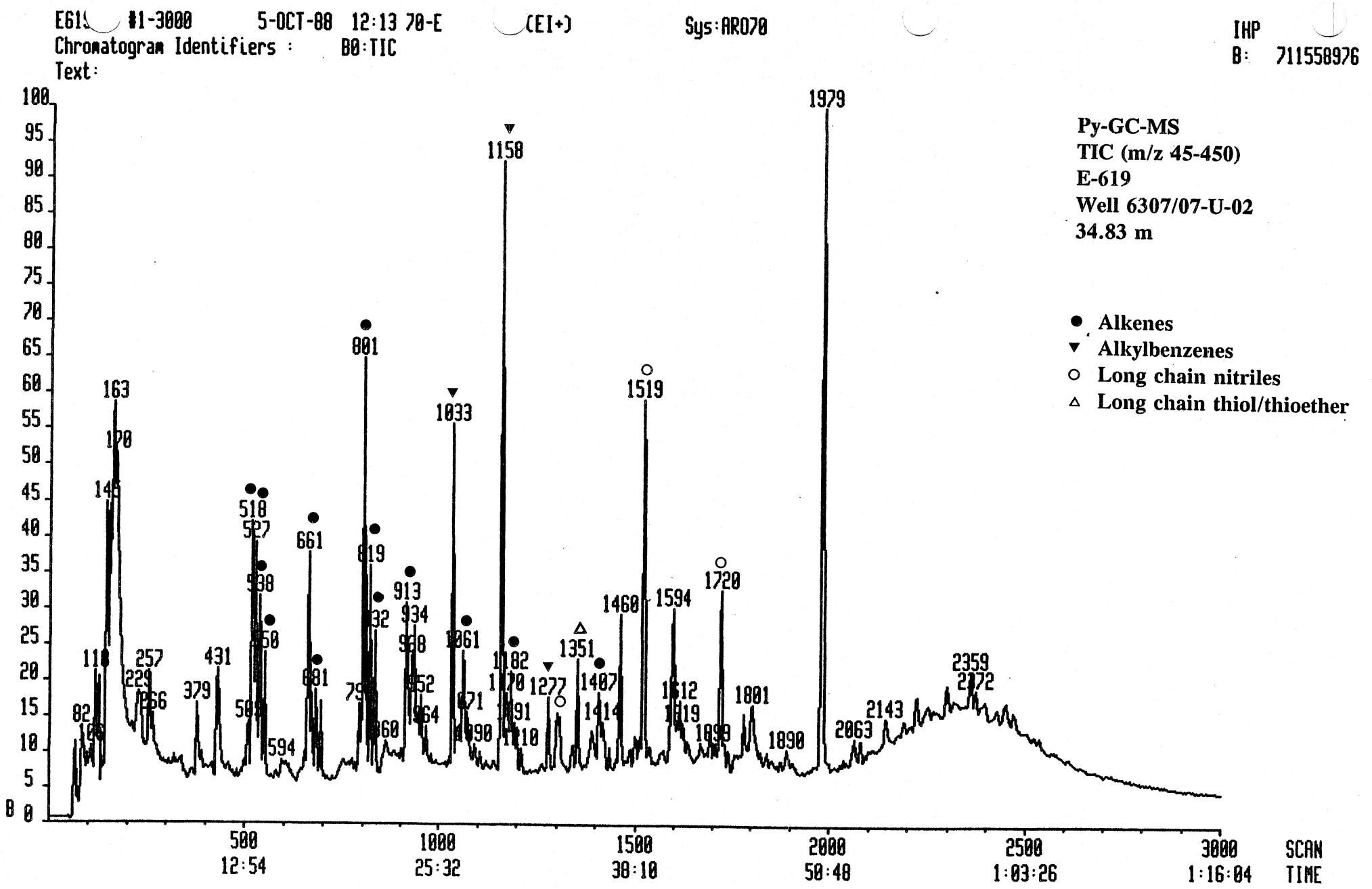
kerogens

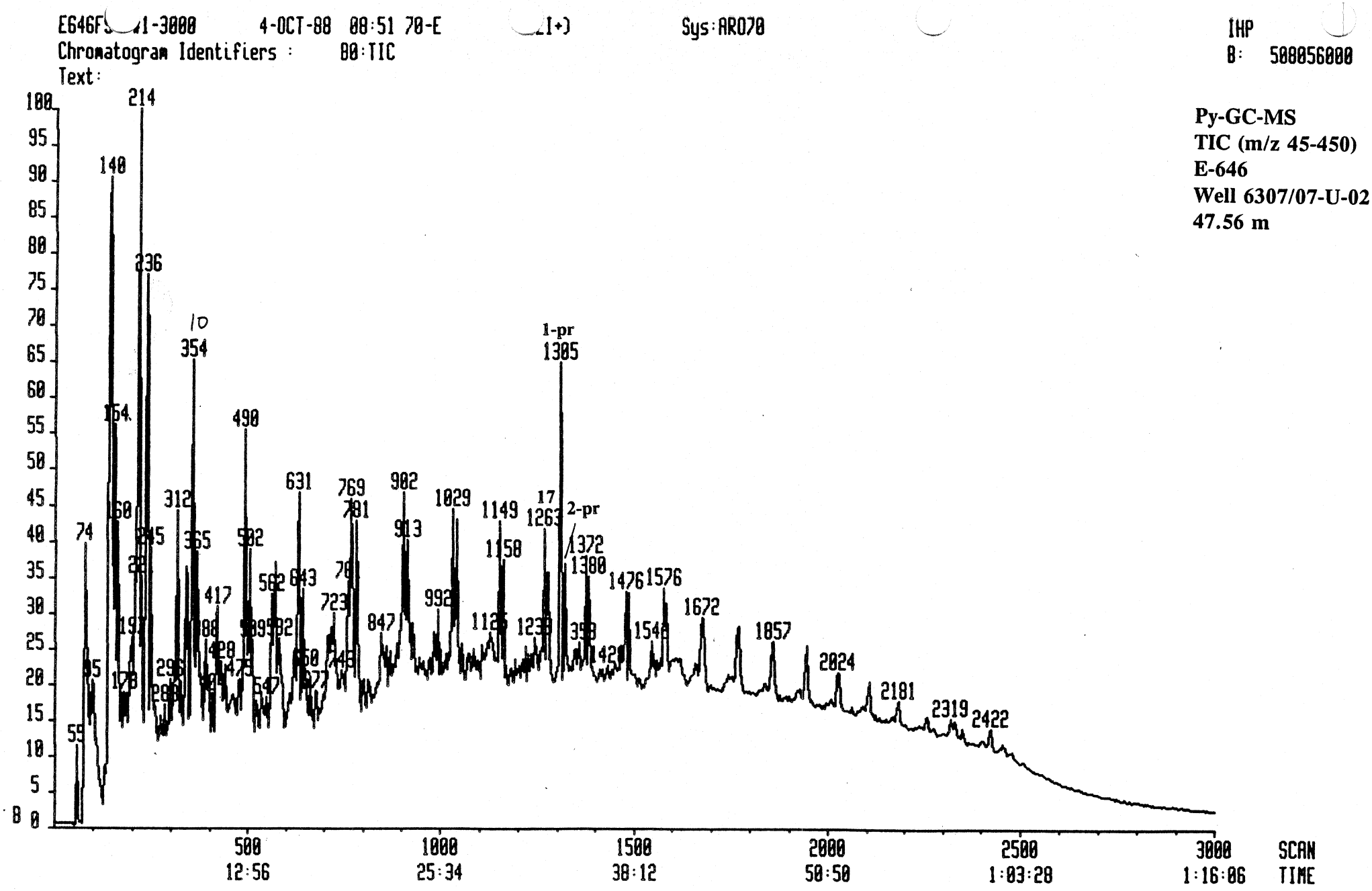
TIC

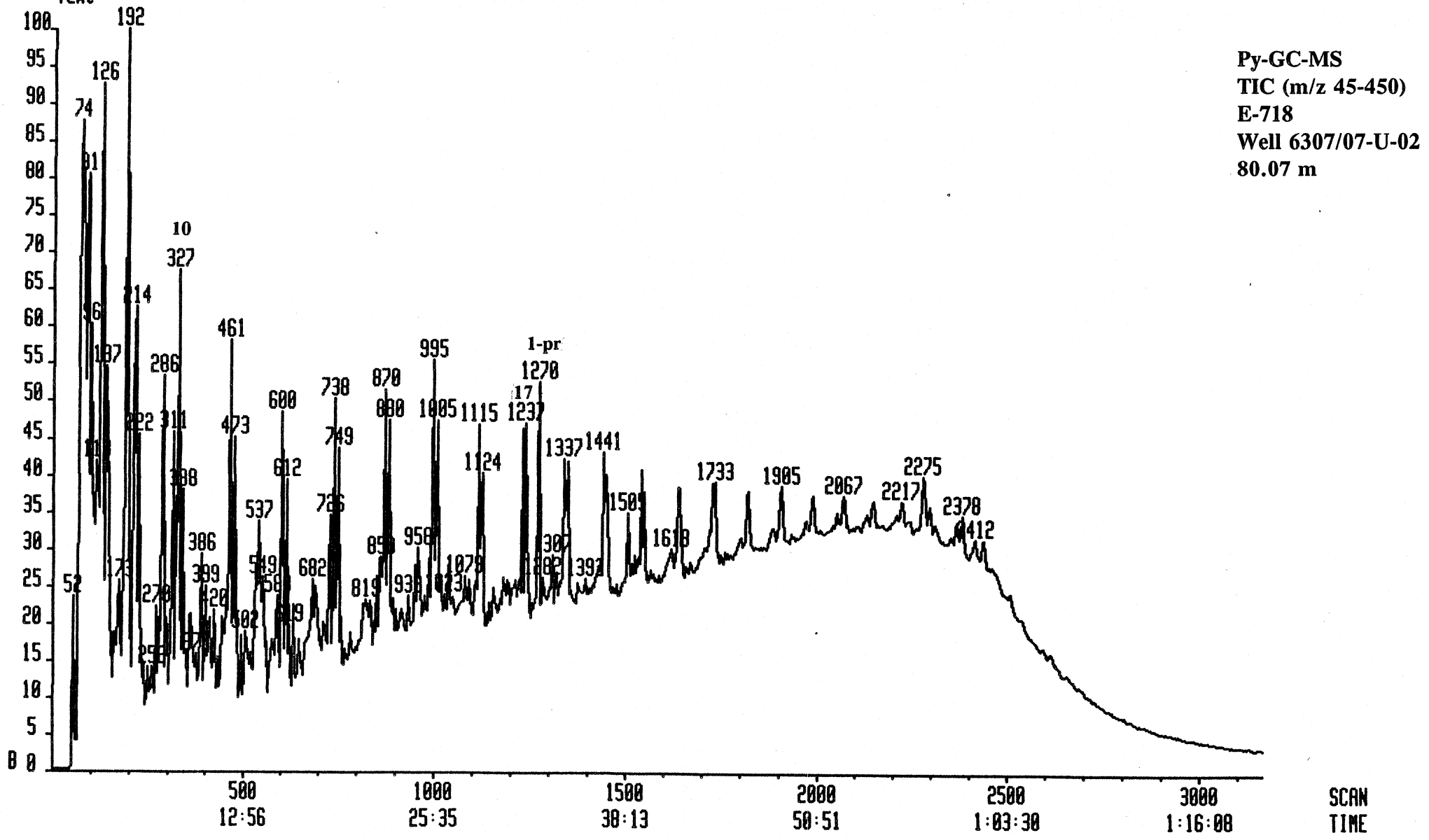
(Further identification of peaks, see section II)

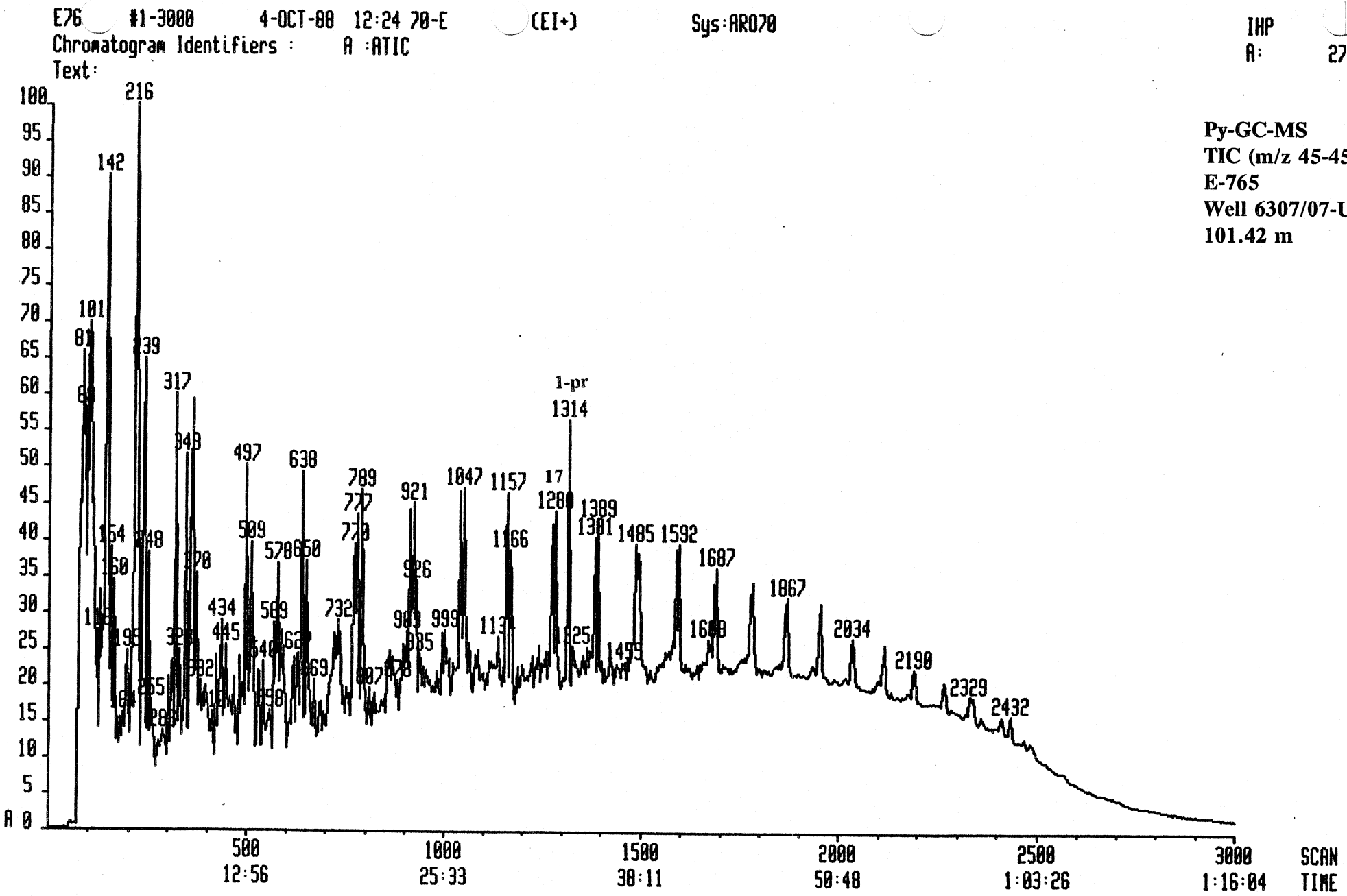
LEGEND TO PYROLYSIS-GC-MS CHROMATOGRAMS

10, 17 etc.	=	Number of C-atoms in n-alkanes, n-alkenes, n-alkadienes.
1-pr	=	1-prisene
2-pr	=	2-pristene
C_nB	=	Alkylbenzenes with n C-atoms in the side chain(s).
MN	=	methylnaphthalenes
DBT	=	dibenzothiophenes
MDBT	=	methyldibenzothiophenes
m+p	=	meta substituted compound and para substituted compounds
o	=	ortho substituted compound


E61 #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070
Chromatogram Identifiers : 80:TIC
Text:
IHP
B: 711558976
Py-GC-MS
TIC (m/z 45-450)
E-619
Well 6307/07-U-02
34.83 m
Alkenes
Alkylbenzenes
Long chain nitriles
Long chain thiol/thioether
1979
1158
1519
1033
801
163
1720
1460
1594
1351
2359
2143
1801
1890
2063
1277
1061
913
661
518
431
379
257
500
12:54
1000
25:32
1500
30:10
2000
50:48
2500
1:03:26
3000
1:16:04
SCAN
TIME


E646FS 1-3000 4-OCT-88 08:51 70-E (+) Sys:AR070
Chromatogram Identifiers : 00:TIC
Text:
IHP
B: 500056000
Py-GC-MS
TIC (m/z 45-450)
E-646
Well 6307/07-U-02
47.56 m
1-pr
2-pr
SCAN
TIME
500 12:56
1000 25:34
1500 38:12
2000 50:50
2500 1:03:28
3000 1:16:06


E71 #1-3165 30-SEP-88 15:38 70-E (EI+) Sys:AR070
Chromatogram Identifiers : 80:TIC
Text:
IHP
B: 431231008
Py-GC-MS
TIC (m/z 45-450)
E-718
Well 6307/07-U-02
80.07 m
1-pr
SCAN
TIME
500
12:56
1000
25:35
1500
30:13
2000
50:51
2500
1:03:30
3000
1:16:00


E76 #1-3000 4-OCT-88 12:24 70-E (EI+) Sys:AR070
Chromatogram Identifiers : A :ATIC
Text:
IHP
A: 27898
Py-GC-MS
TIC (m/z 45-450)
E-765
Well 6307/07-U-02
101.42 m
1-pr
A
SCAN
TIME
500
12:56
1000
25:33
1500
38:11
2000
50:48
2500
1:03:26
3000
1:16:04

IKU SINTEF-GRUPPEN

Figure III.6.6b

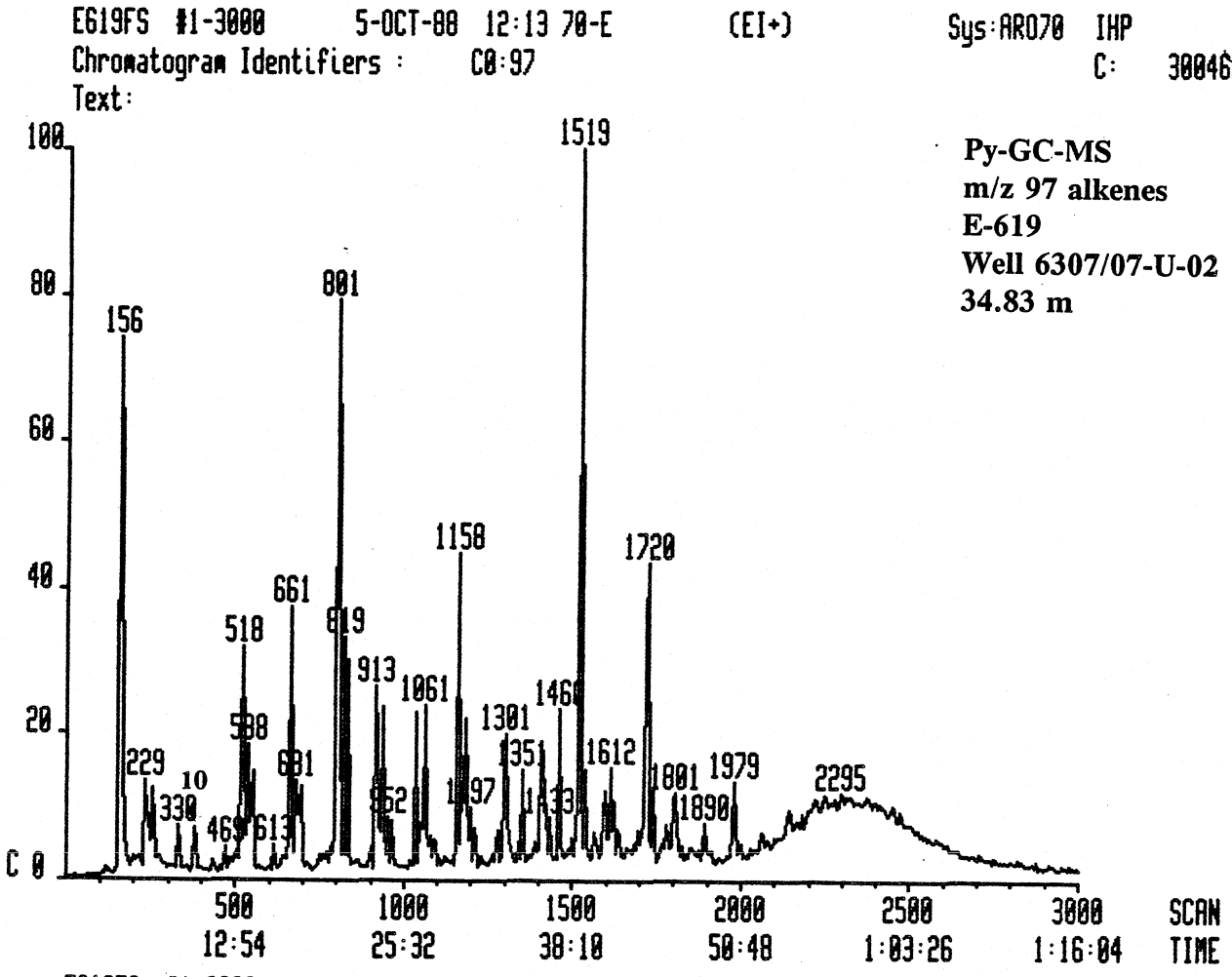
PY-GC-MS

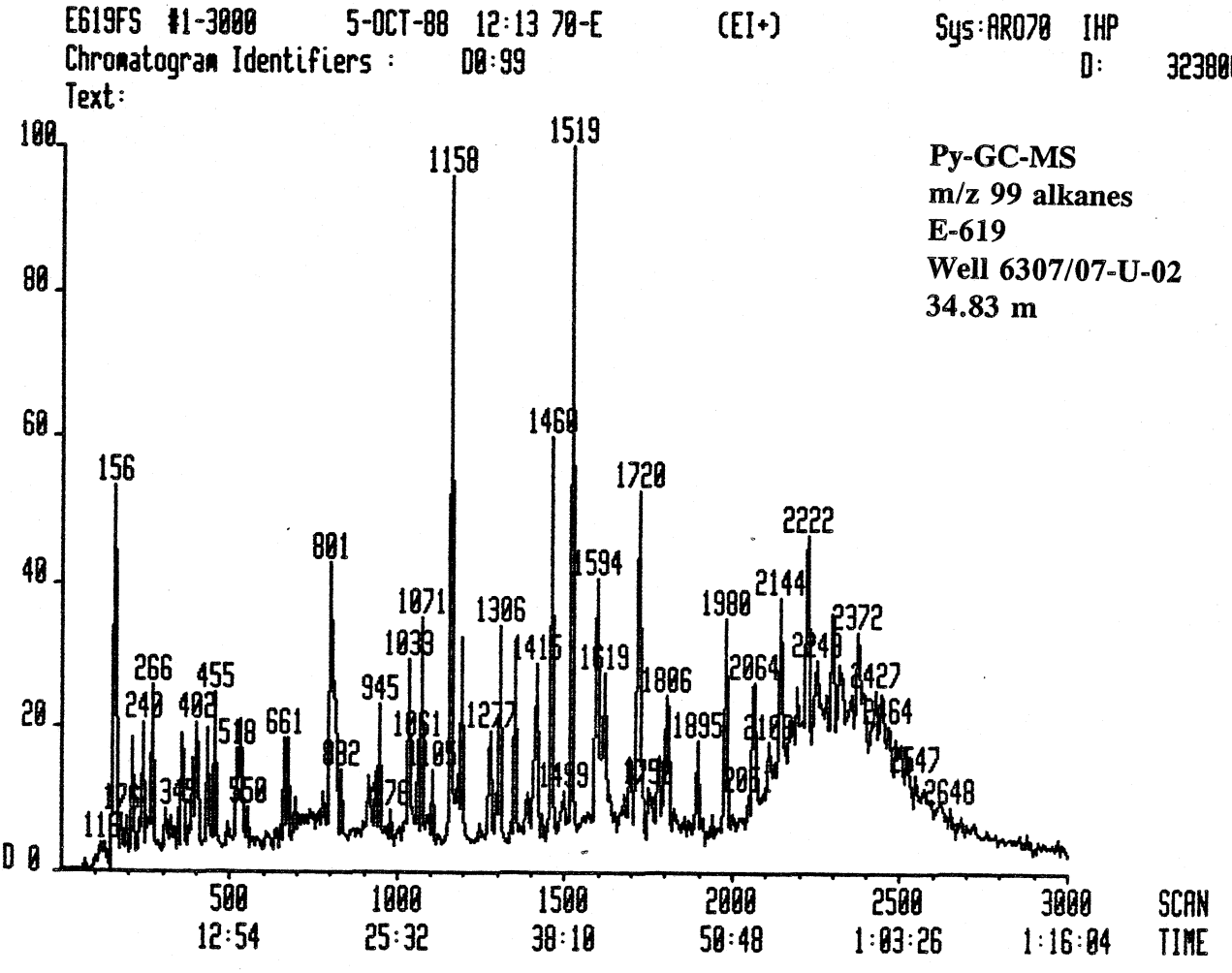
of

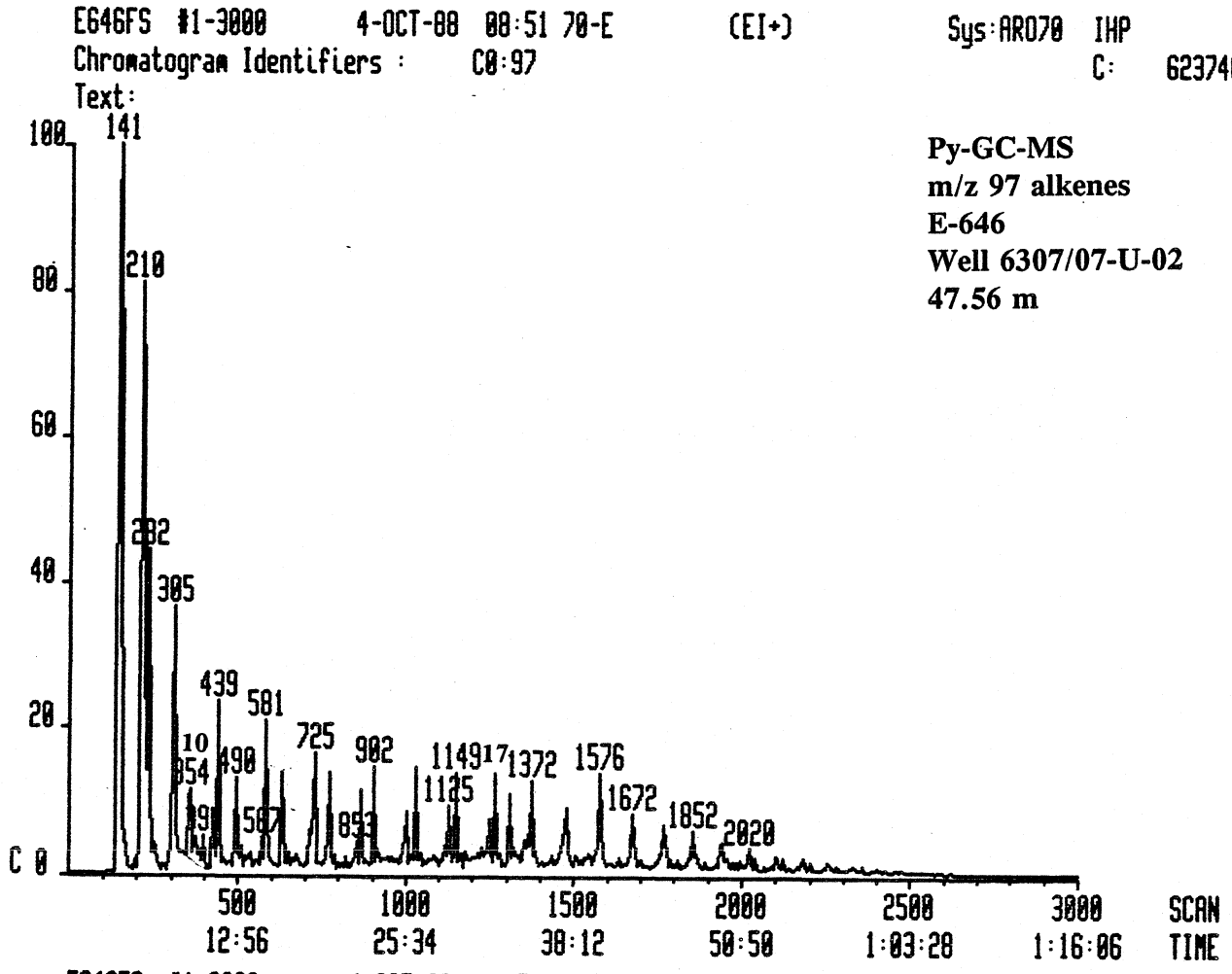
kerogens

m/z 97,99

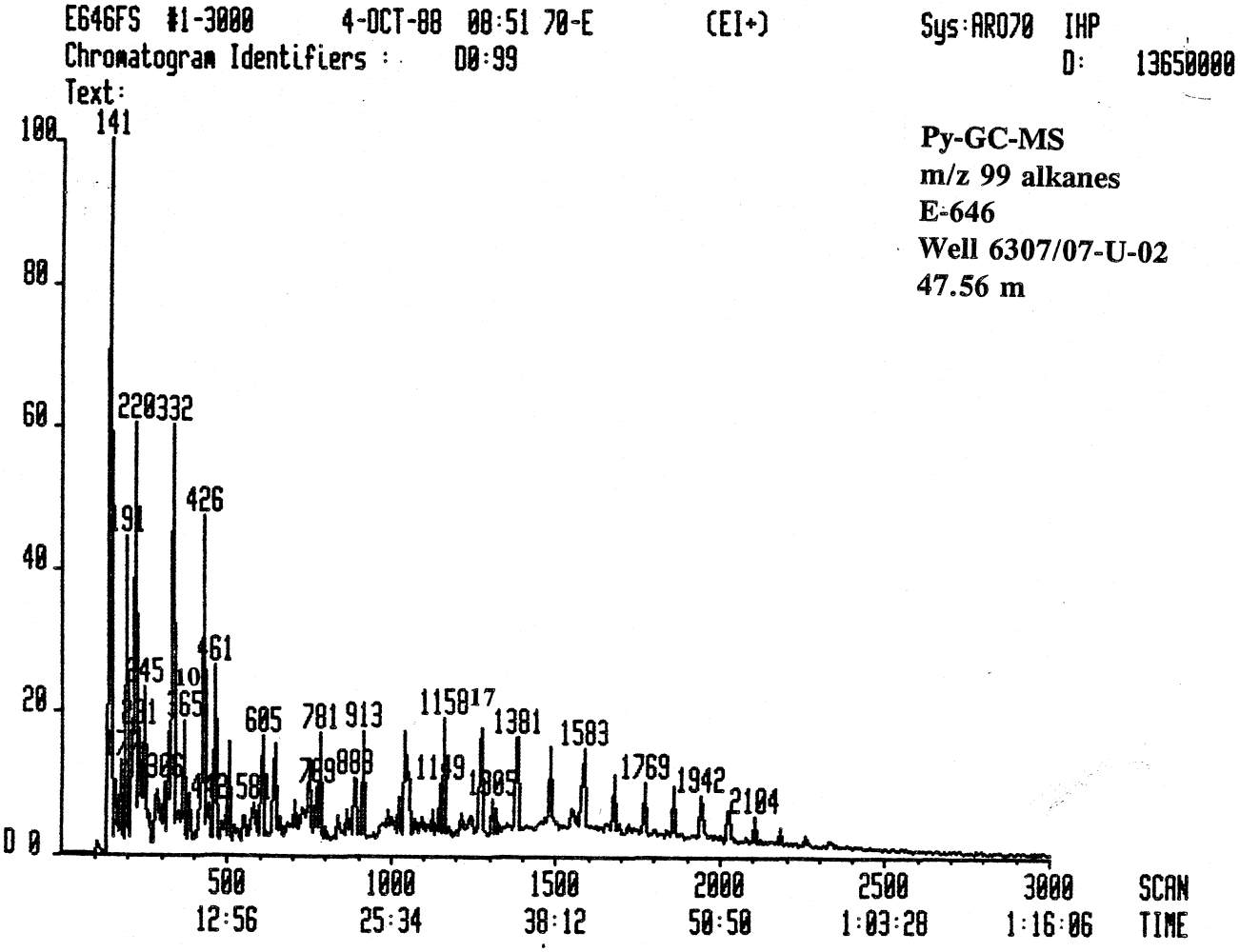
(Further identification of peaks, see section II)


E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:97 C: 30046000
Text:
Py-GC-MS
m/z 97 alkenes
E-619
Well 6307/07-U-02
34.83 m
SCAN
TIME

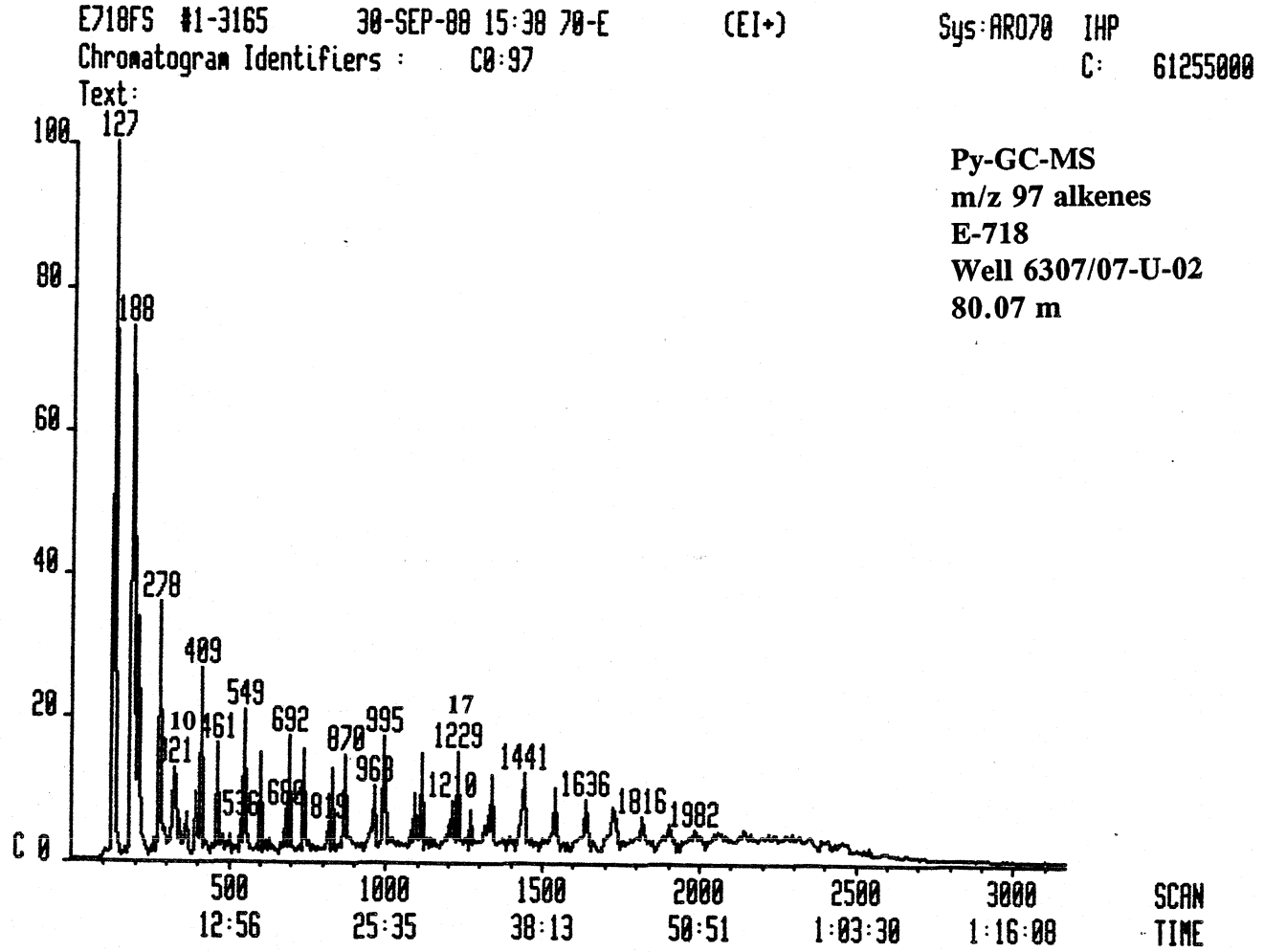

E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : D0:99 D: 3238000
Text:
Py-GC-MS
m/z 99 alkanes
E-619
Well 6307/07-U-02
34.83 m
SCAN
TIME



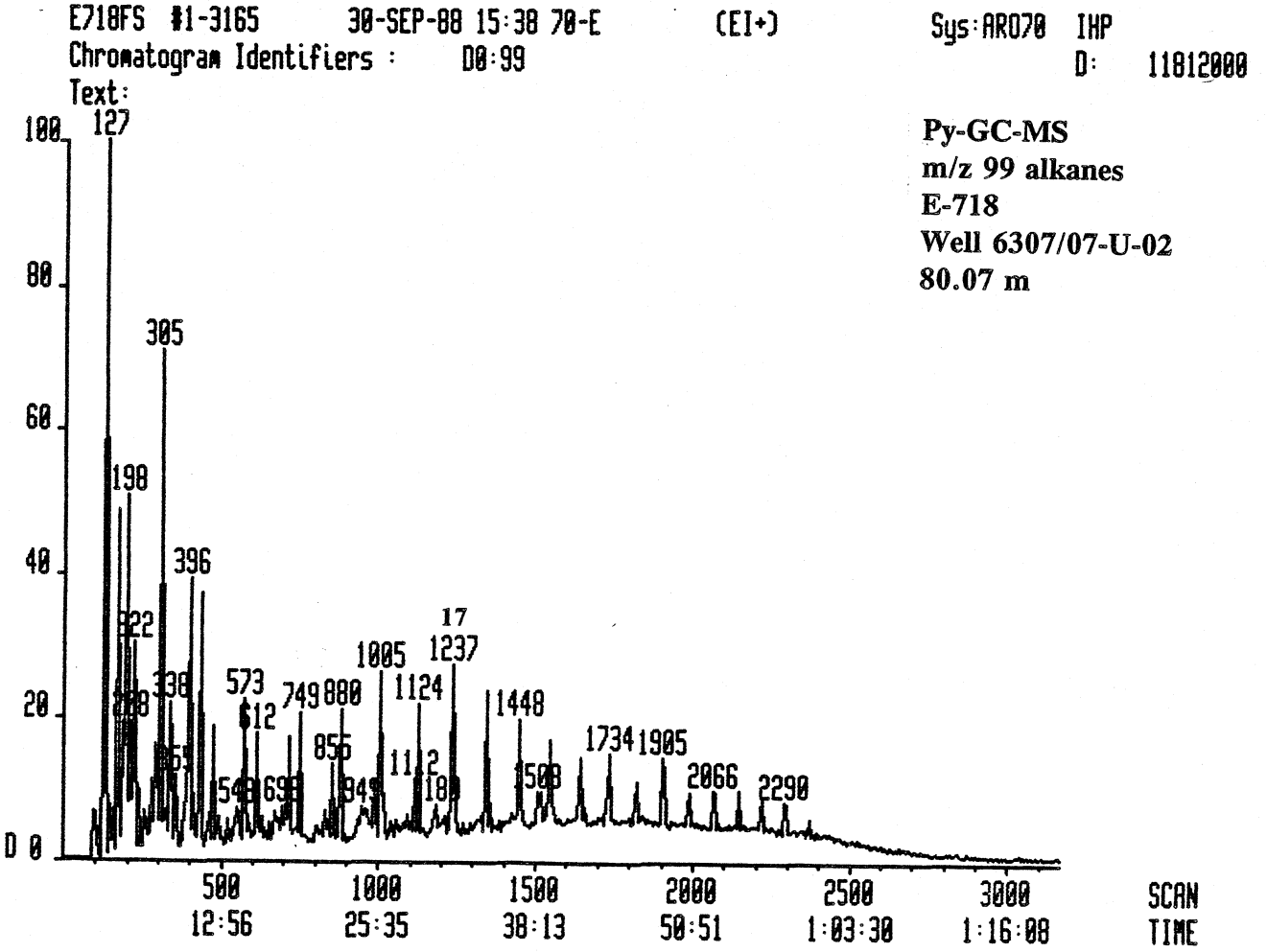
Py-GC-MS
m/z 97 alkenes
E-646
Well 6307/07-U-02
47.56 m



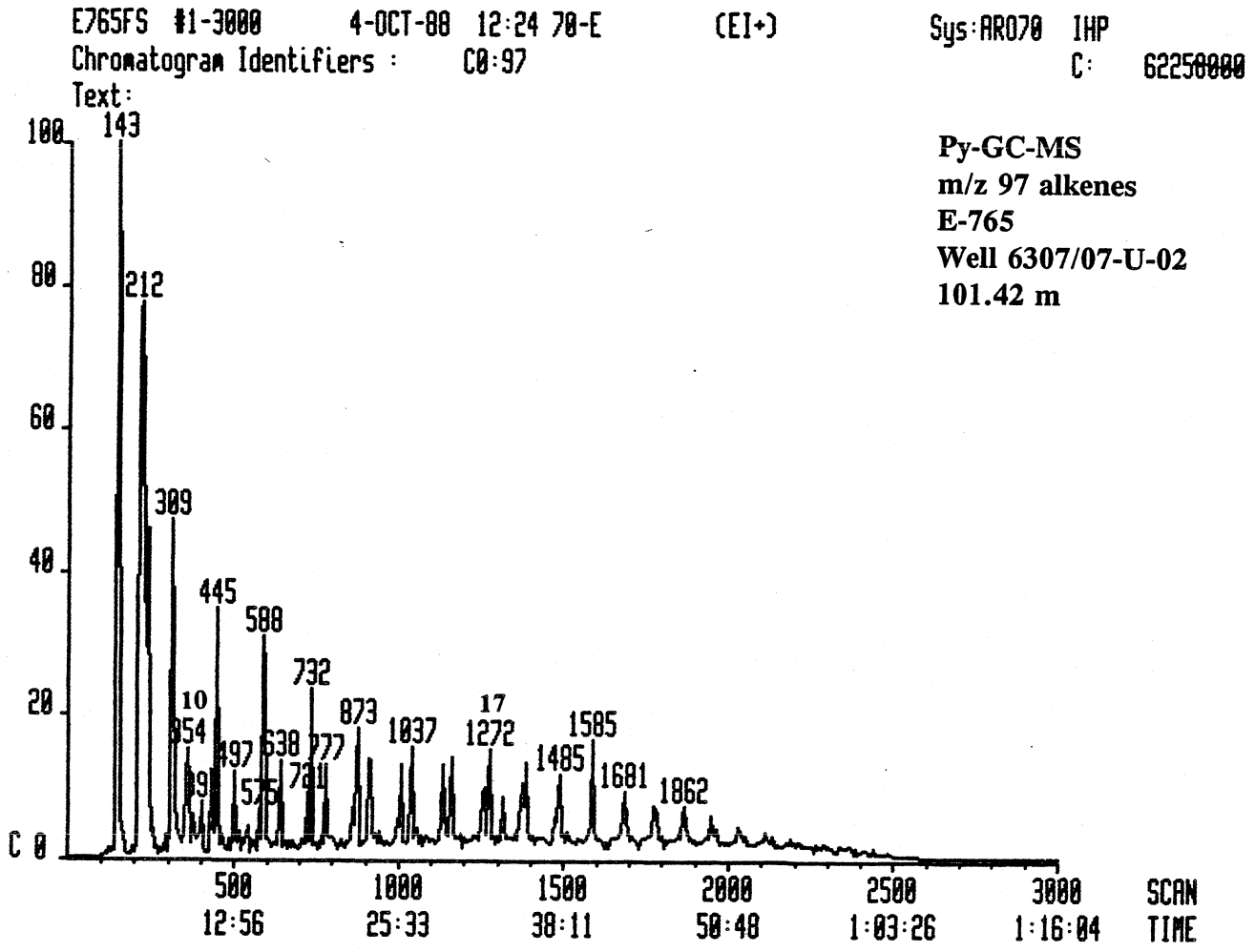
Py-GC-MS
m/z 99 alkanes
E-646
Well 6307/07-U-02
47.56 m



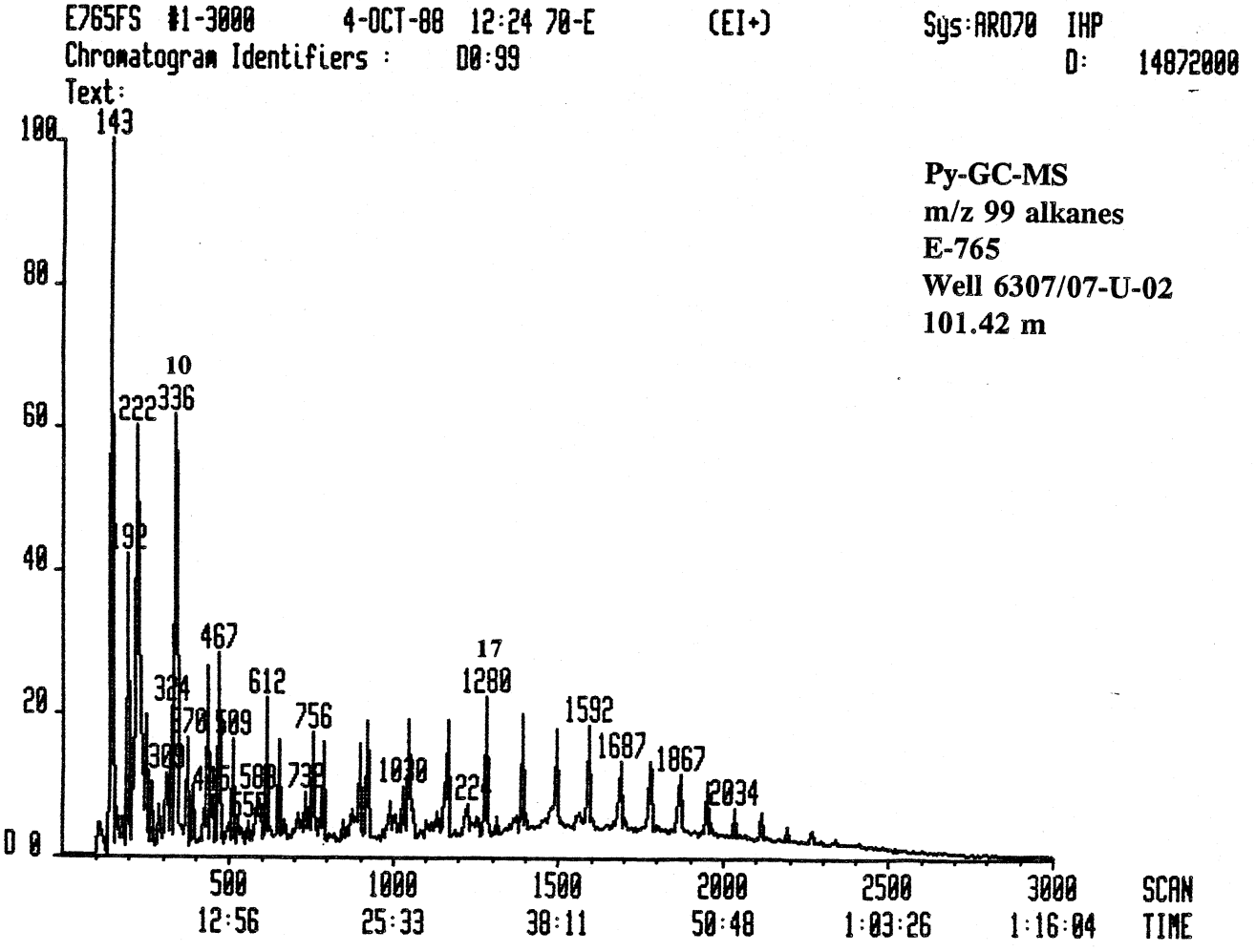
Py-GC-MS
m/z 97 alkenes
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 99 alkanes
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 97 alkenes
E-765
Well 6307/07-U-02
101.42 m



Py-GC-MS
m/z 99 alkanes
E-765
Well 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.6c

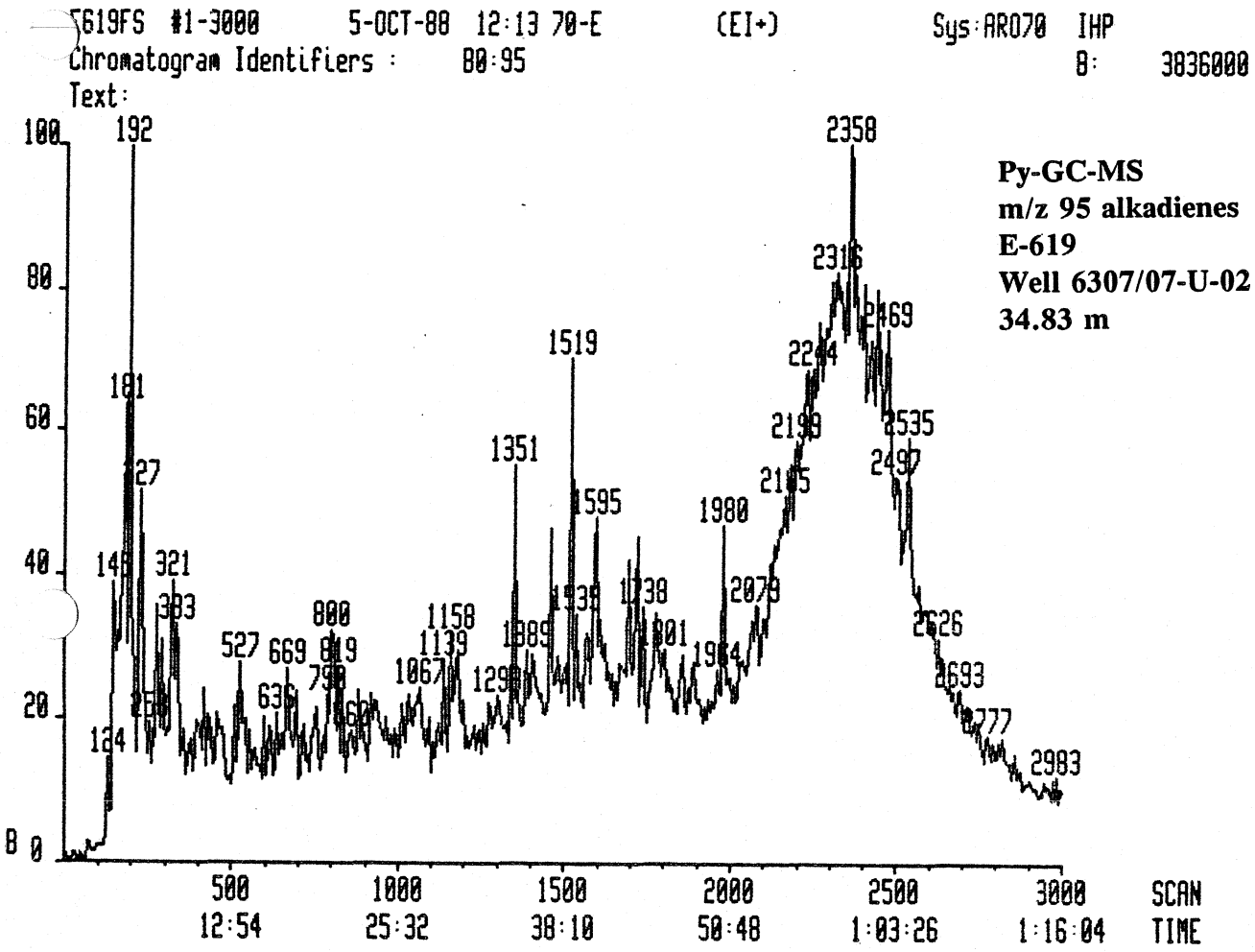
PY-GC-MS

of

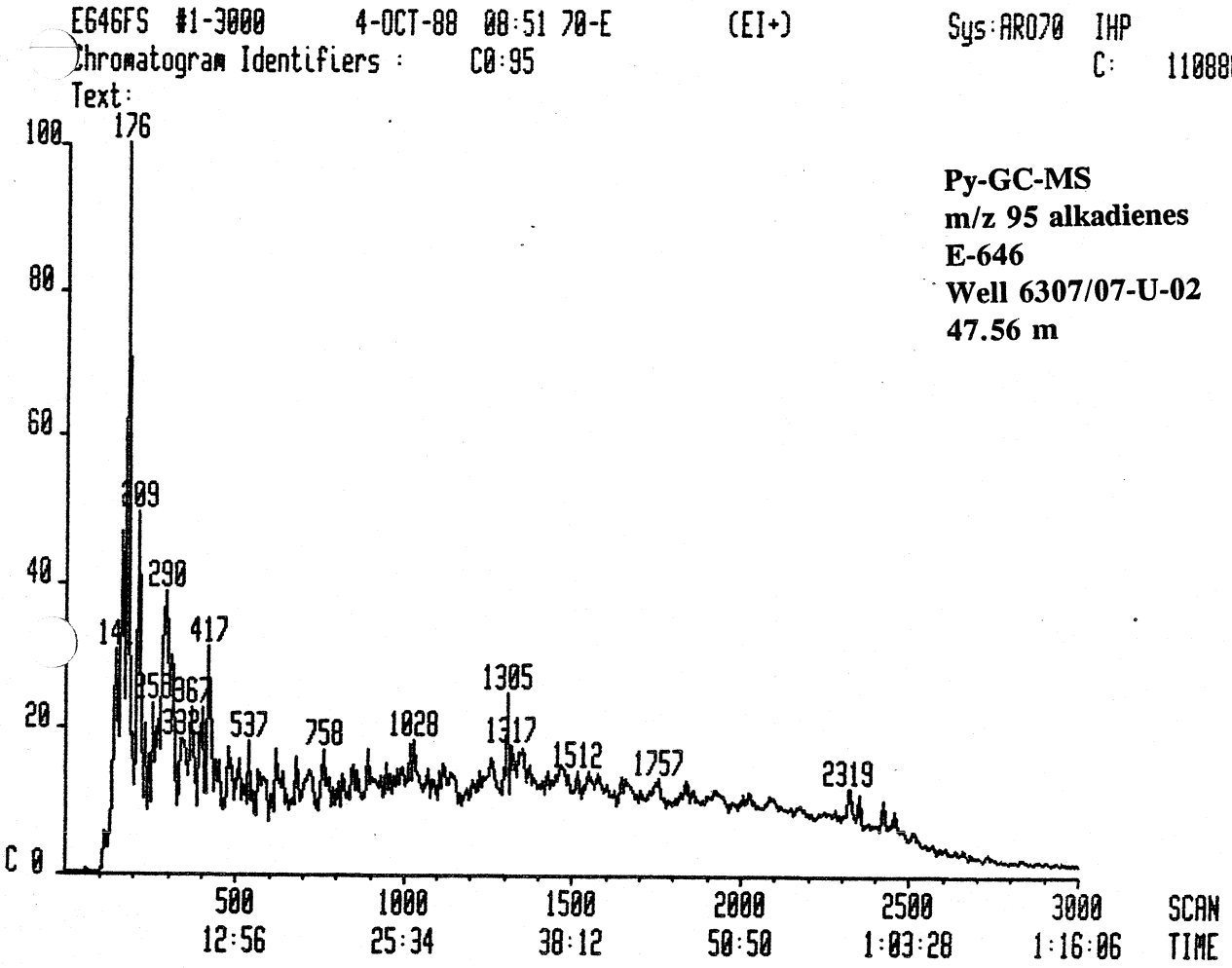
kerogens

m/z 95

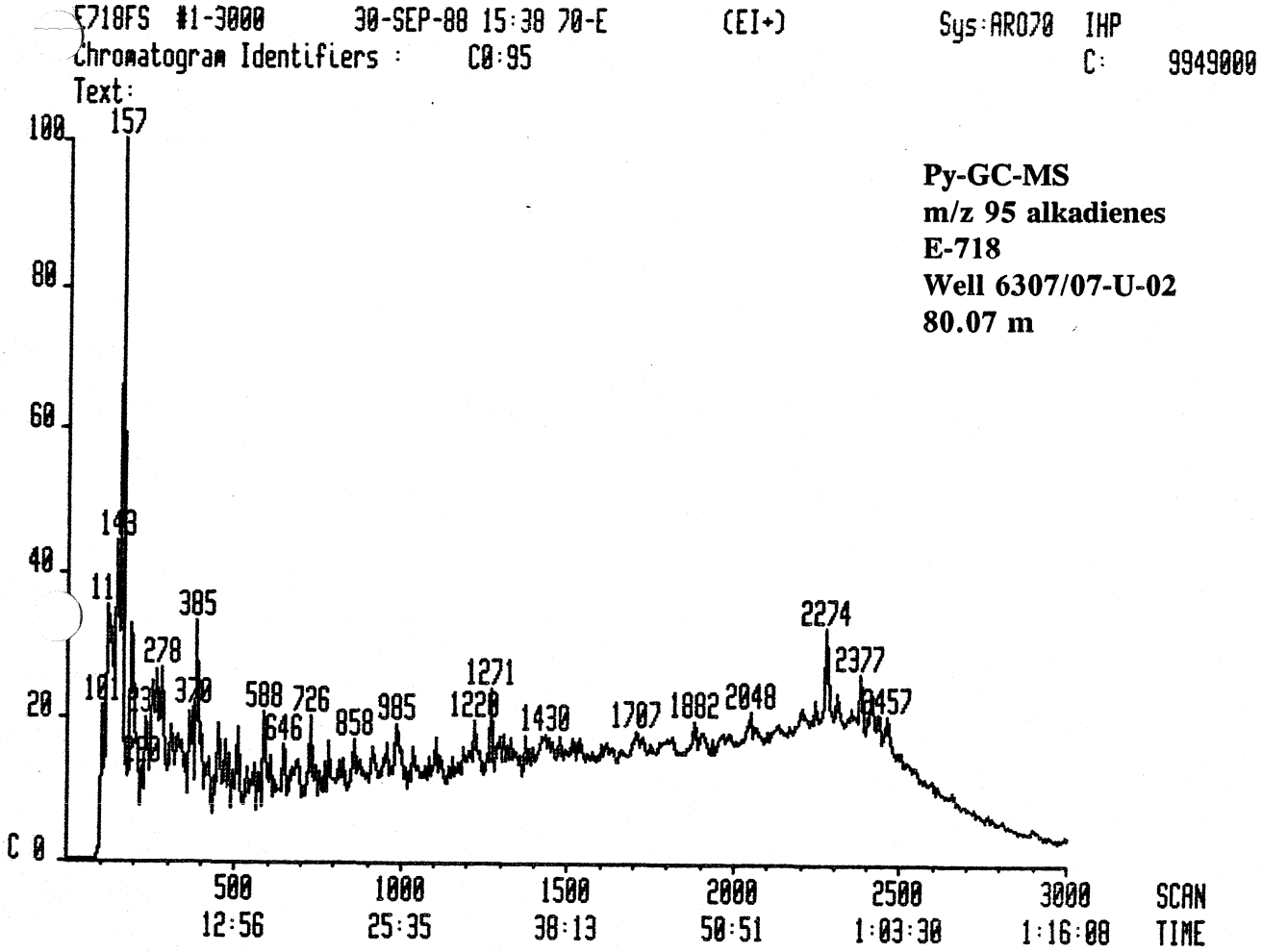
(Further identification of peaks, see section II)



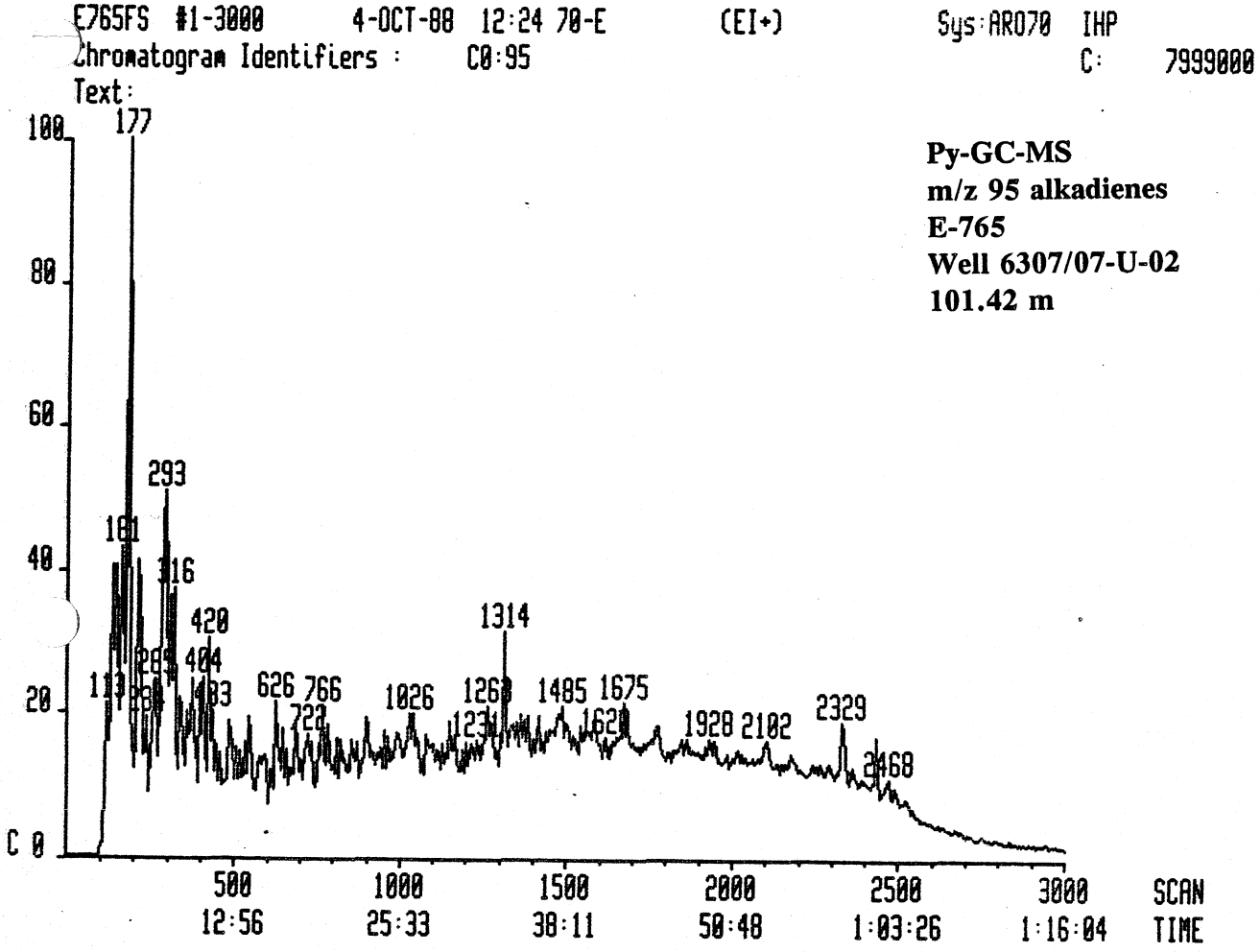
Py-GC-MS
m/z 95 alkadienes
E-619
Well 6307/07-U-02
34.83 m



Py-GC-MS
m/z 95 alkadienes
E-646
Well 6307/07-U-02
47.56 m



Py-GC-MS
m/z 95 alkadienes
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 95 alkadienes
E-765
Well 6307/07-U-02
101.42 m

IKU SINTEF-GRUPPEN

Figure III.6.6d

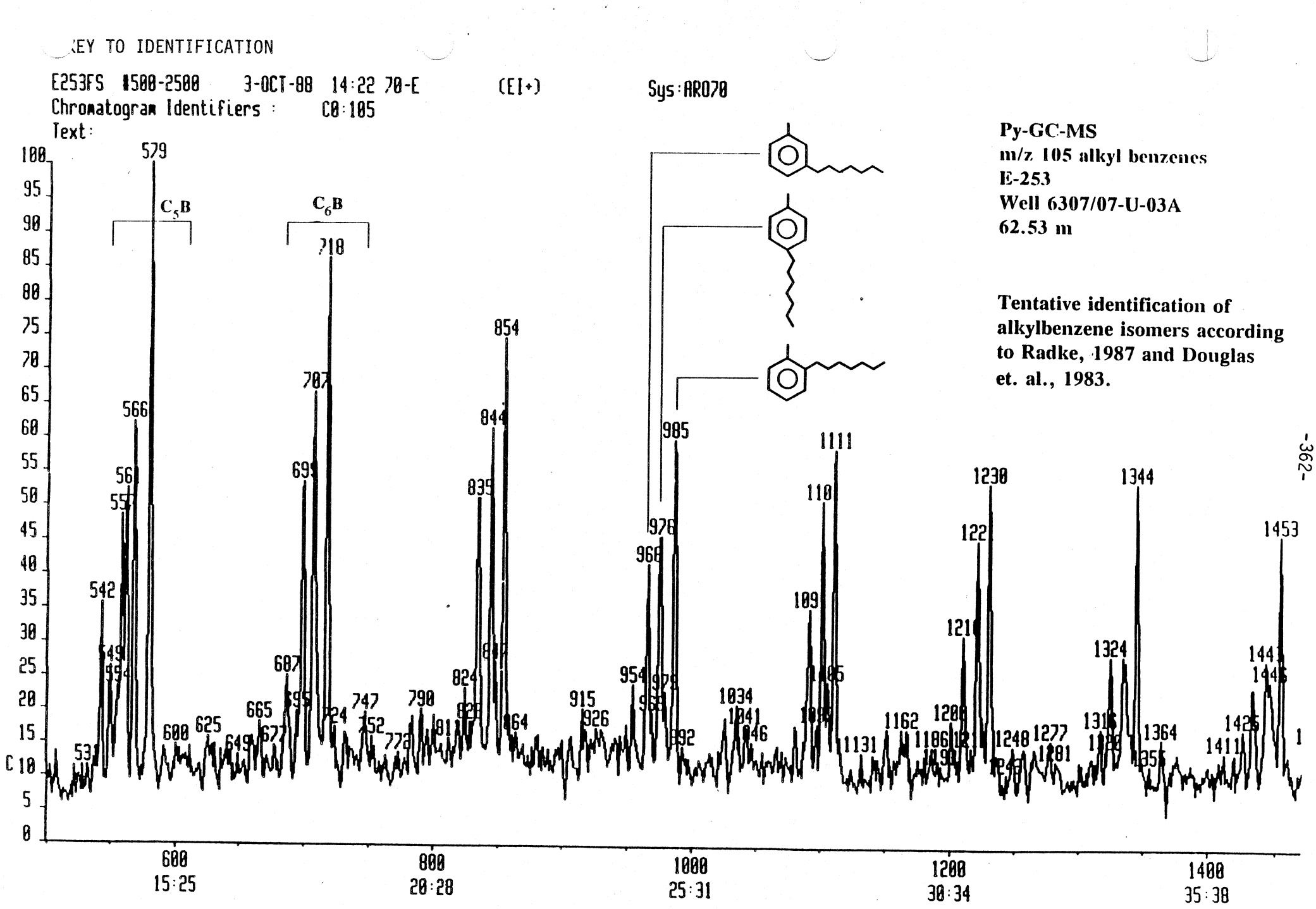
PY-GC-MS

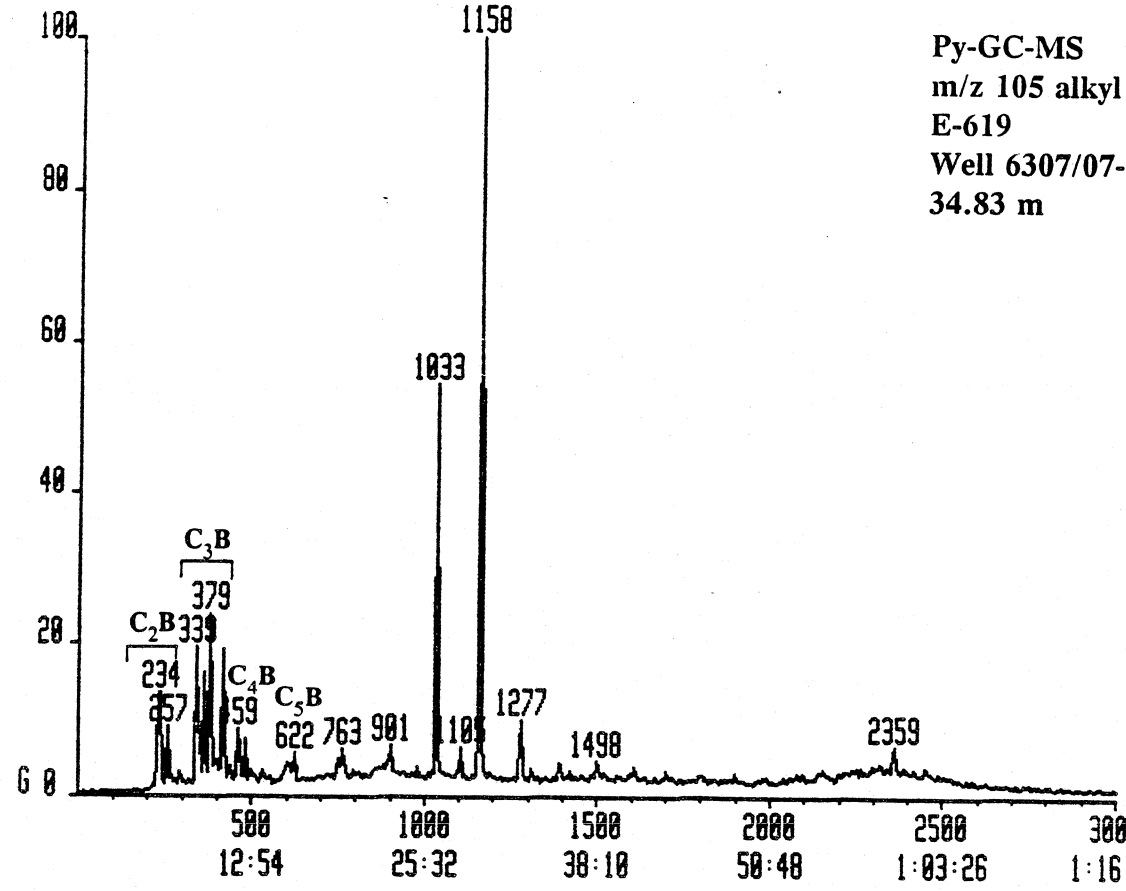
of

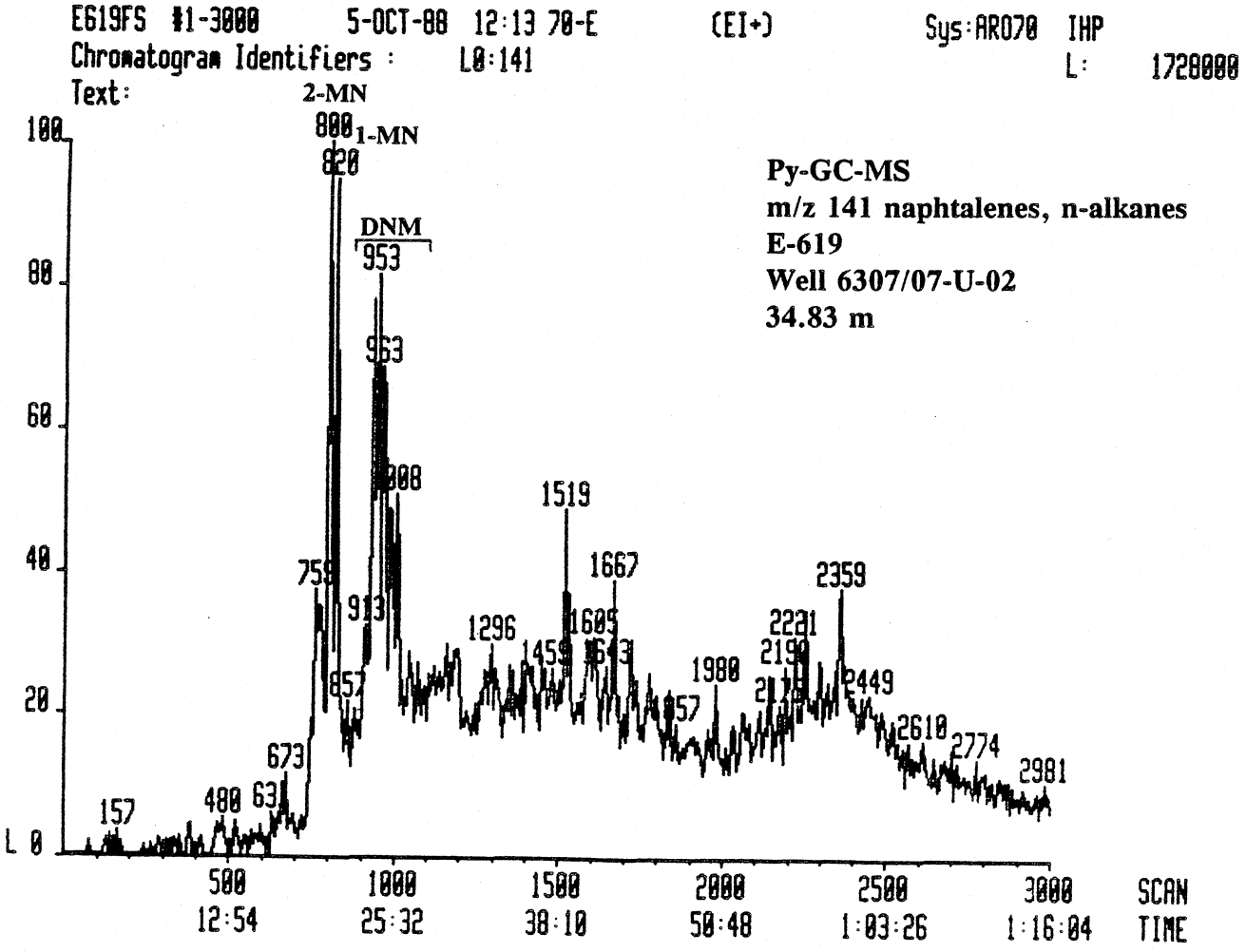
kerogens

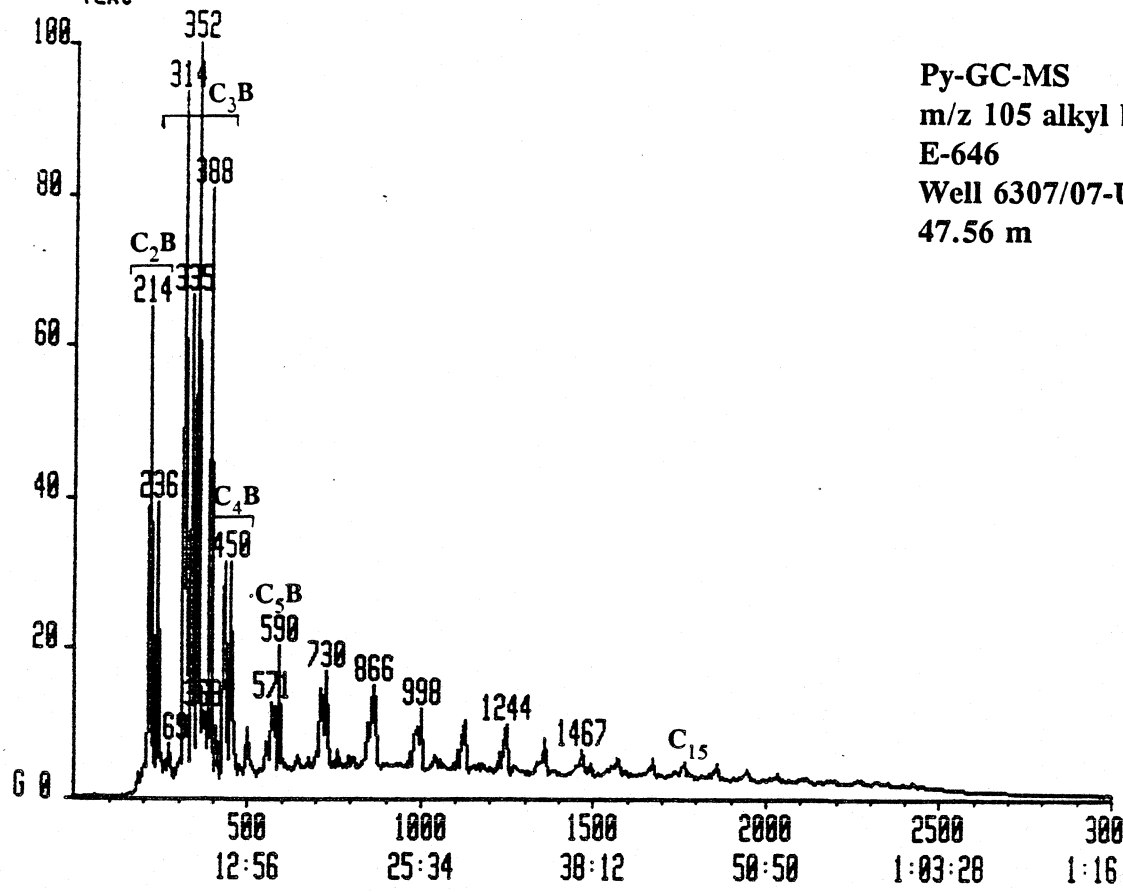
m/z 105, 141

(Further identification of peaks, see section II)

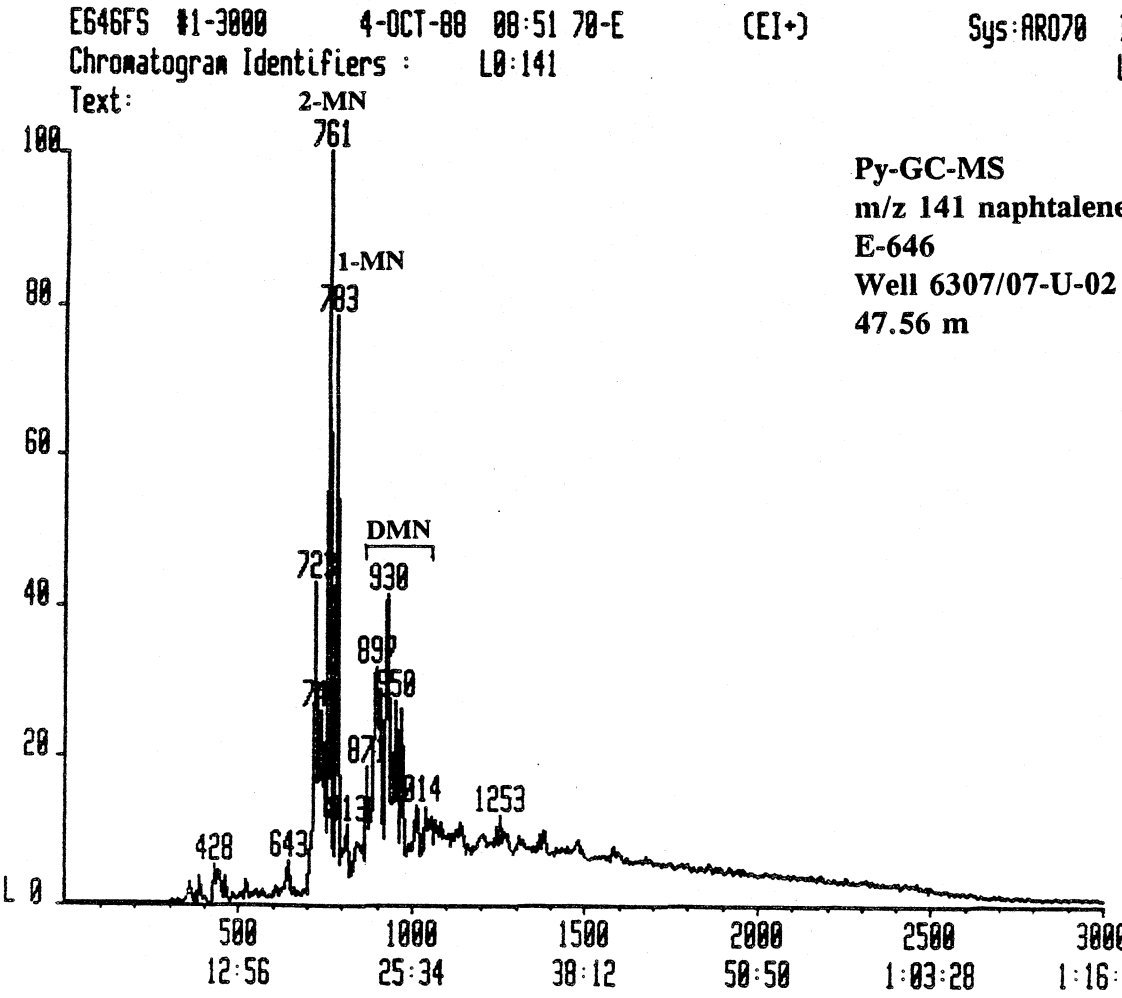

KEY TO IDENTIFICATION
E253FS #500-2500 3-OCT-88 14:22 70-E (EI+) Sys:AR070
Chromatogram Identifiers : C0:105
Text:
C5B
C6B
579
718
707
566
542
854
844
835
985
976
968
1111
1230
1344
1453
122
110
109
1324
1441
915
1034
1162
1364
1425
1411
600
625
665
747
790
824
954
1131
1248
1277
1281
600
15:25
800
20:28
1000
25:31
1200
30:34
1400
35:38
Py-GC-MS
m/z 105 alkyl benzenes
E-253
Well 6307/07-U-03A
62.53 m
Tentative identification of alkylbenzene isomers according to Radke, 1987 and Douglas et. al., 1983.


E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : G0:105 G: 28873000
Text:
Py-GC-MS
m/z 105 alkyl benzenes
E-619
Well 6307/07-U-02
34.83 m
C3B
C2B
C4B
C5B
1158
1033
1277
1498
2359
SCAN
TIME

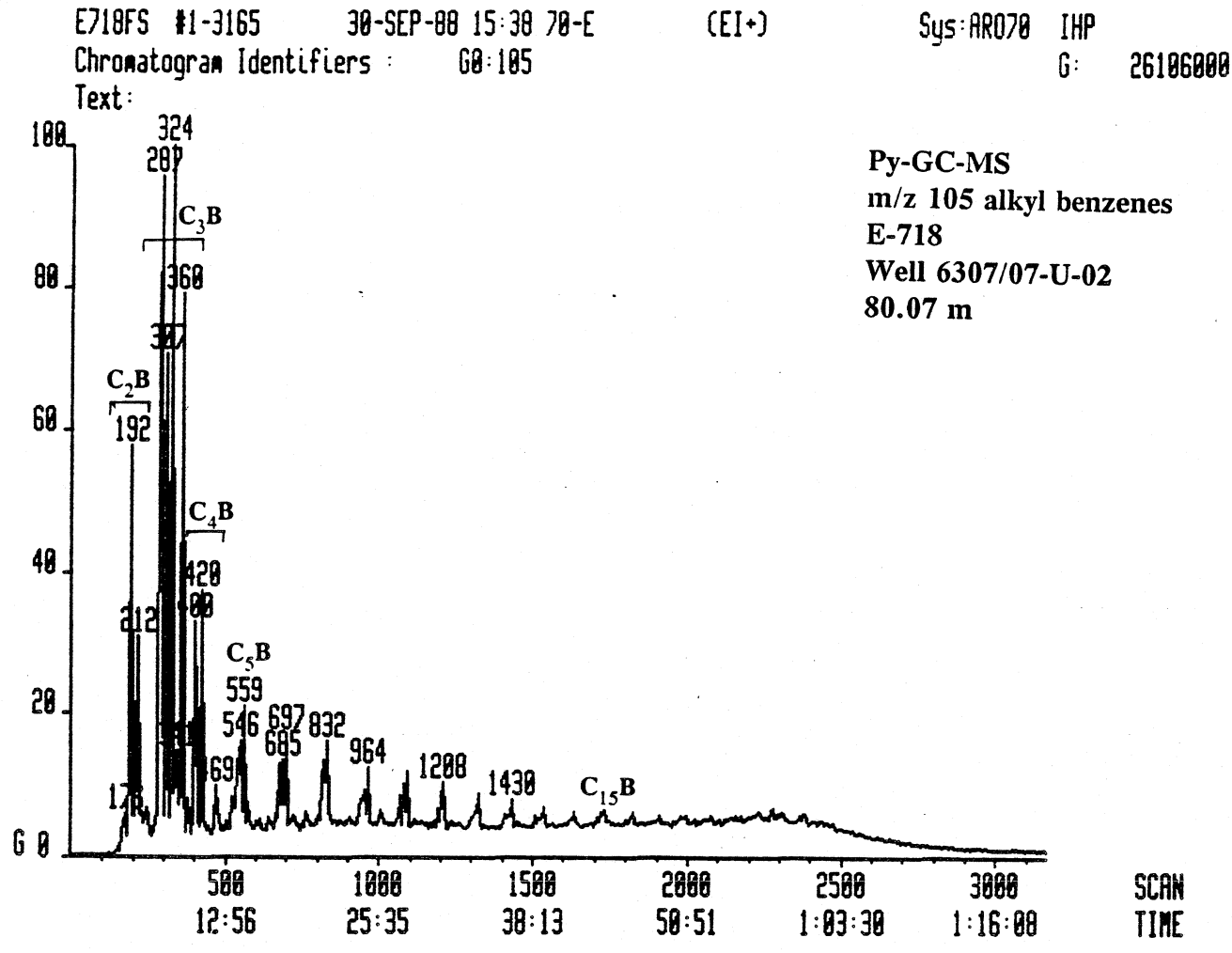

E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : L0:141 L: 1728000
Text:
Py-GC-MS
m/z 141 naphtalenes, n-alkanes
E-619
Well 6307/07-U-02
34.83 m
2-MN
1-MN
DNM
1519
1667
2359
SCAN
TIME



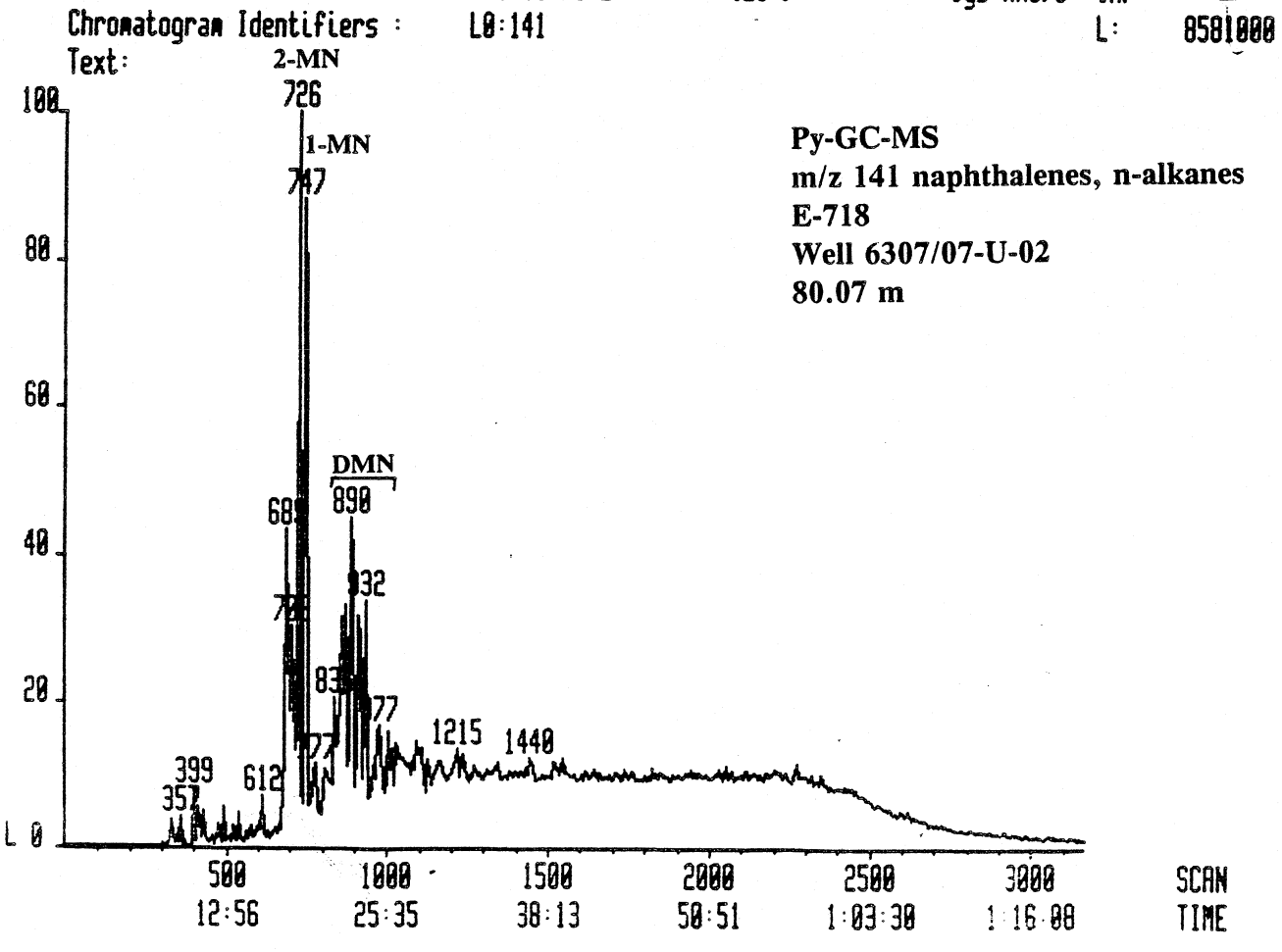
Py-GC-MS
m/z 105 alkyl benzenes
E-646
Well 6307/07-U-02
47.56 m



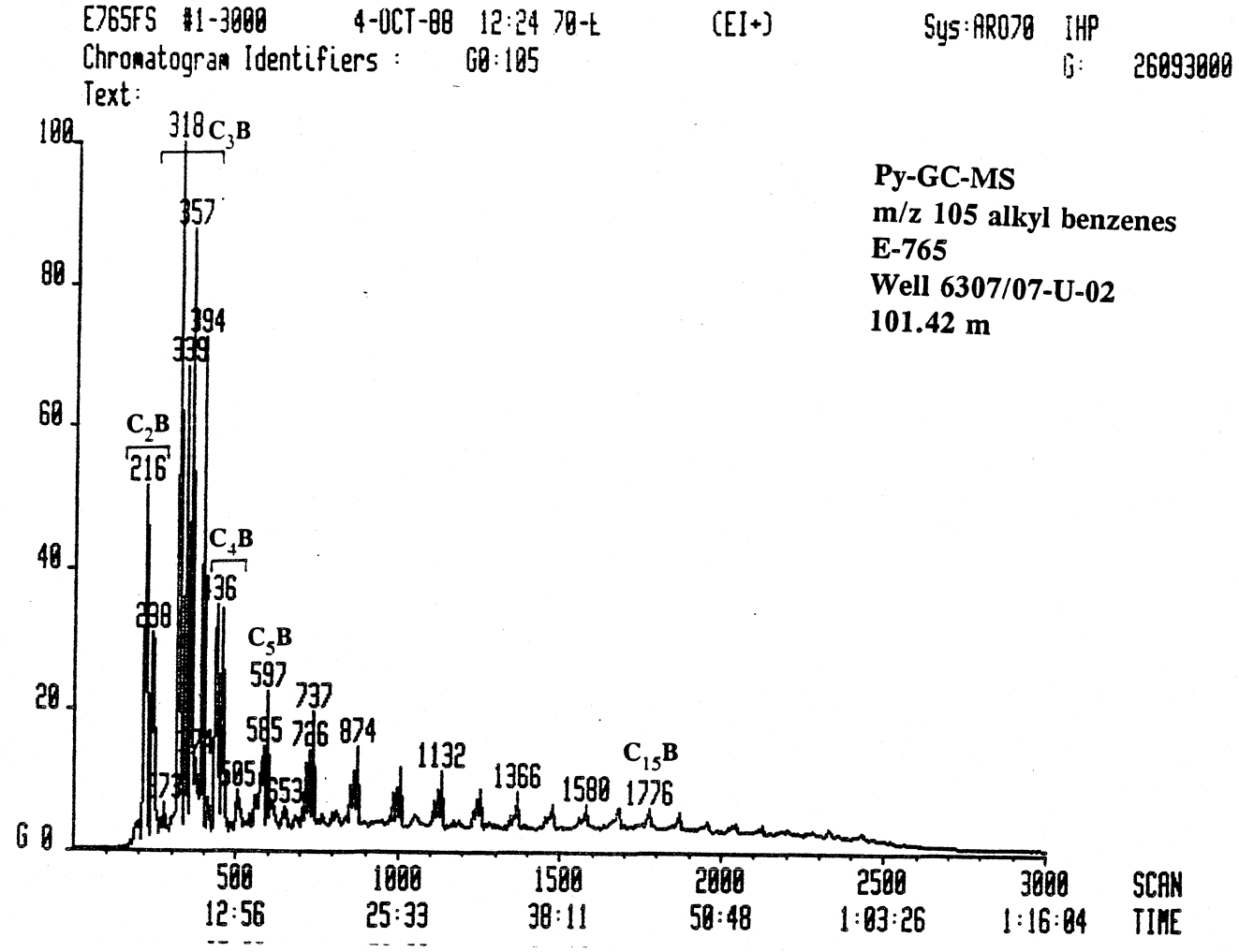
Py-GC-MS
m/z 141 naphtalenes, n-alkanes
E-646
Well 6307/07-U-02
47.56 m



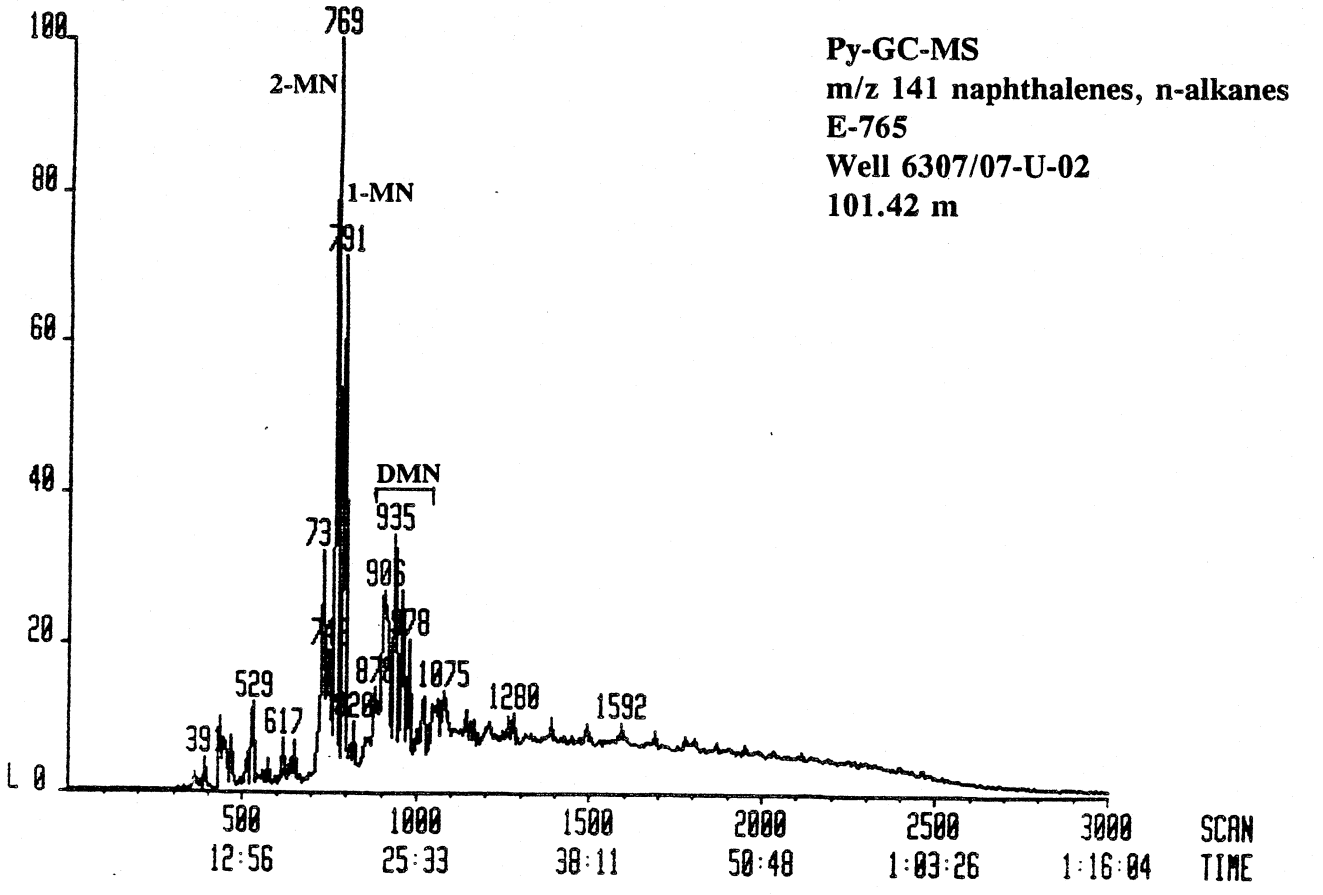
Py-GC-MS
m/z 105 alkyl benzenes
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 141 naphthalenes, n-alkanes
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 105 alkyl benzenes
E-765
Well 6307/07-U-02
101.42 m



Py-GC-MS
m/z 141 naphthalenes, n-alkanes
E-765
Well 6307/07-U-02
101.42 m

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Figure III.6.6e

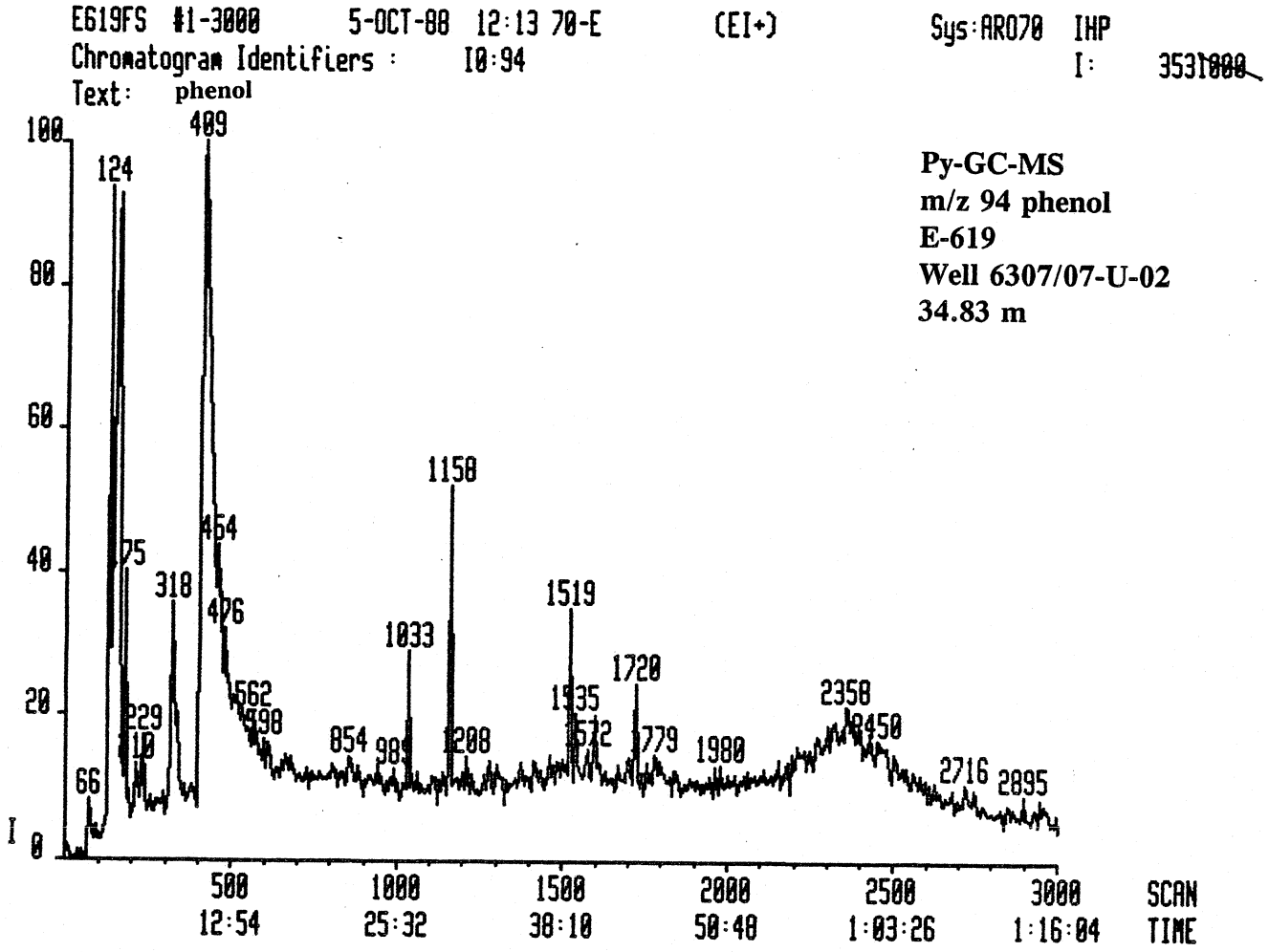
PY-GC-MS

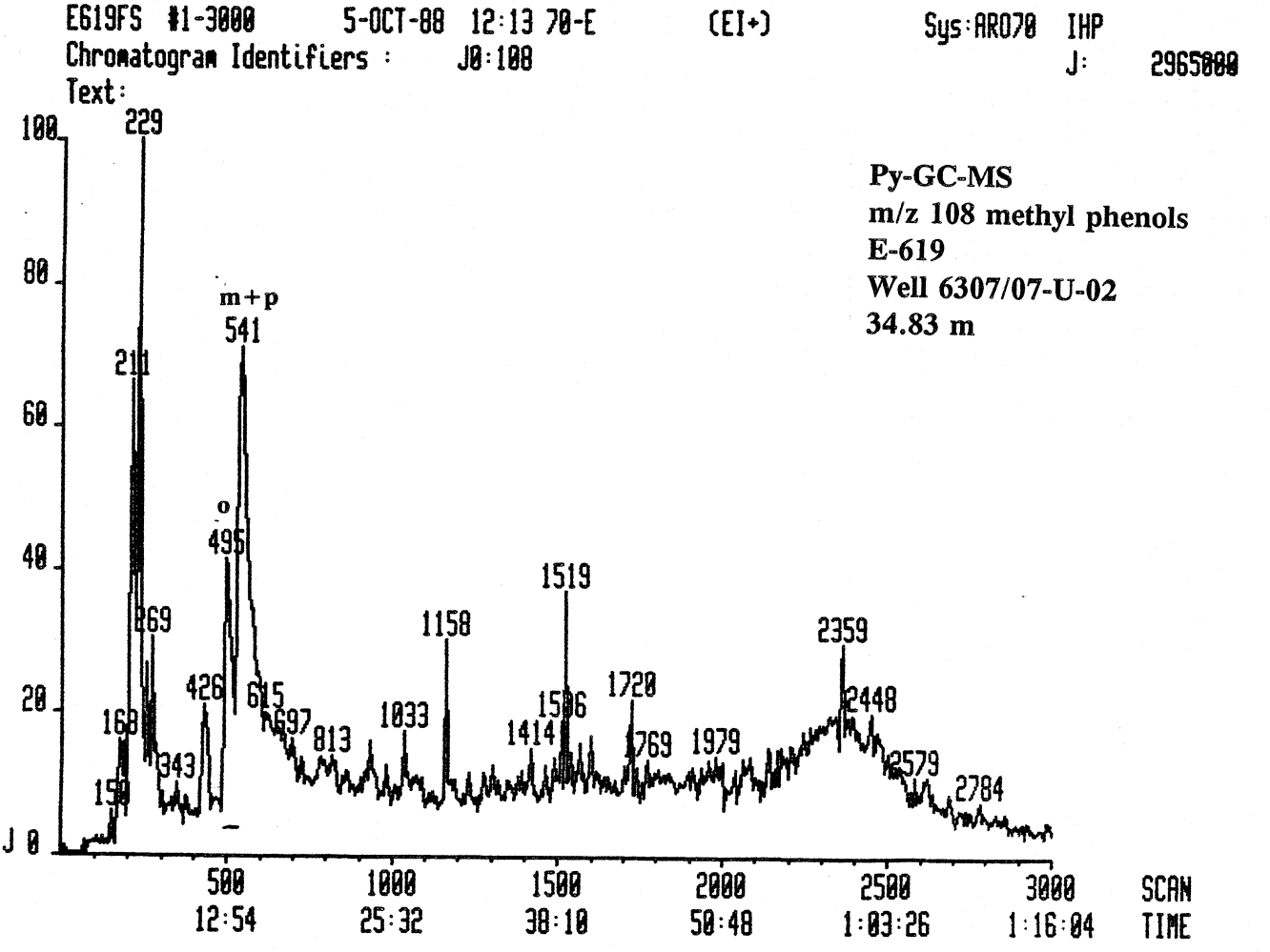
of

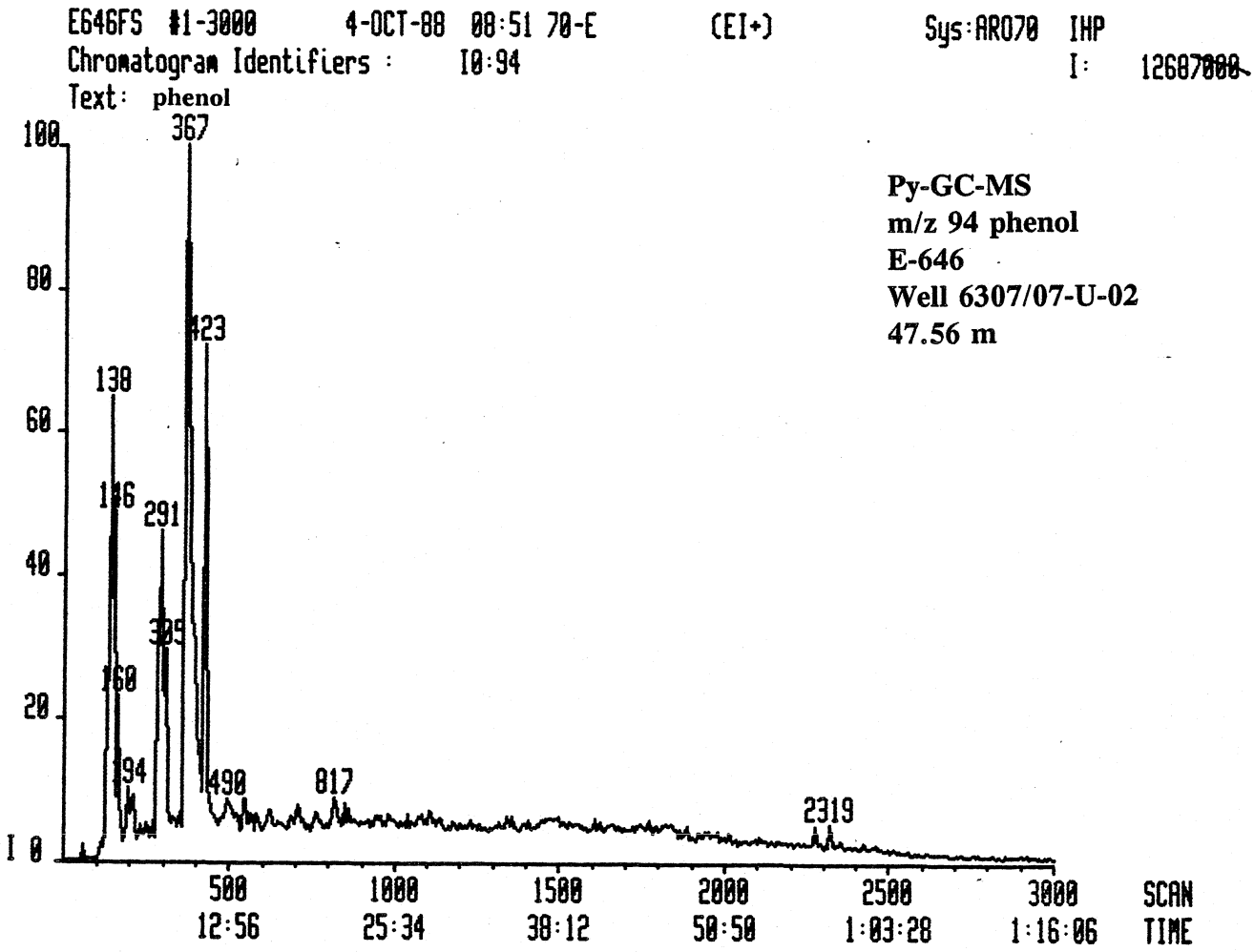
kerogens

m/z 94, 108

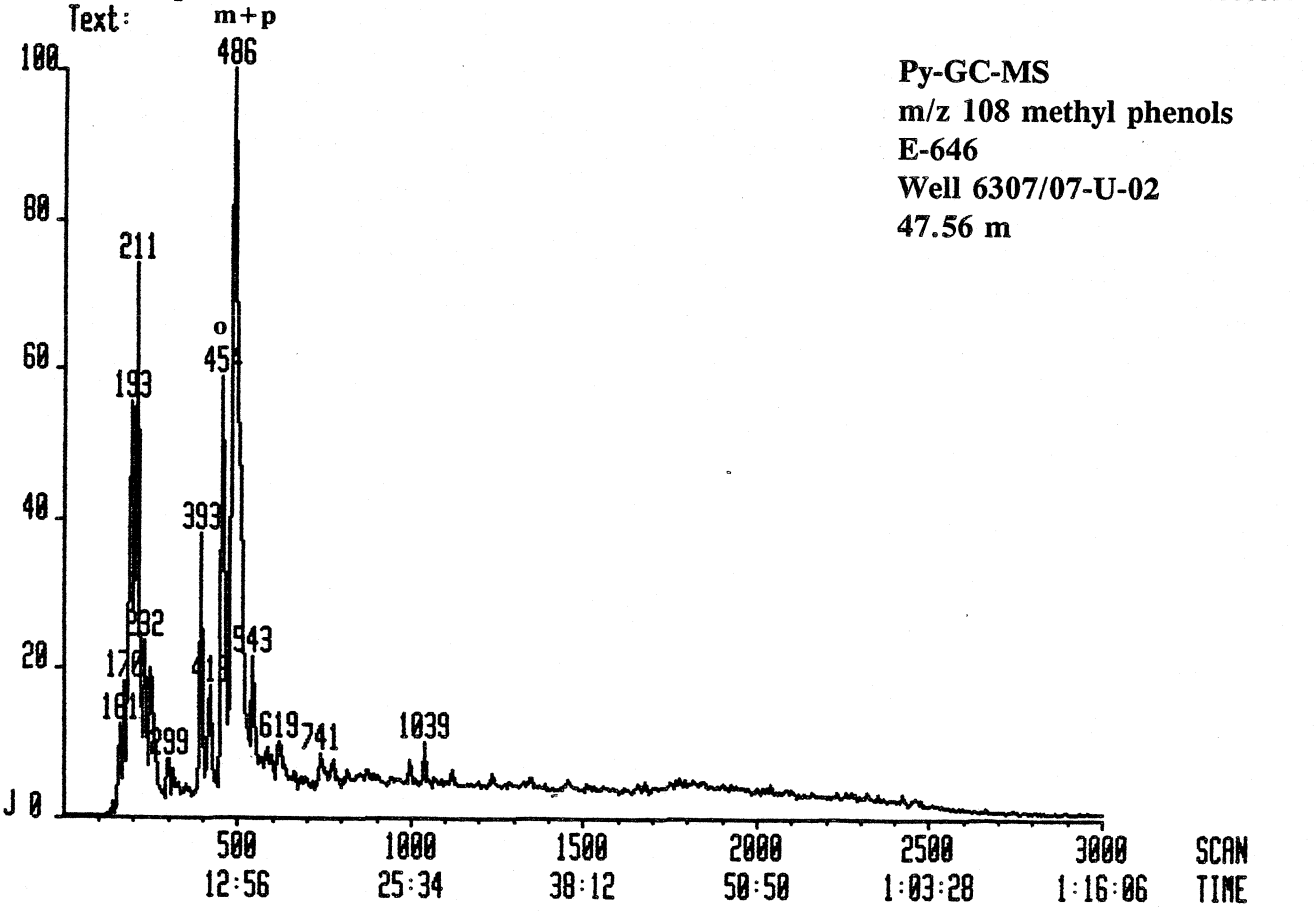
(Further identification of peaks, see section II)


E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : I0:94 I: 3531000
Text: phenol
Py-GC-MS
m/z 94 phenol
E-619
Well 6307/07-U-02
34.83 m
SCAN
TIME

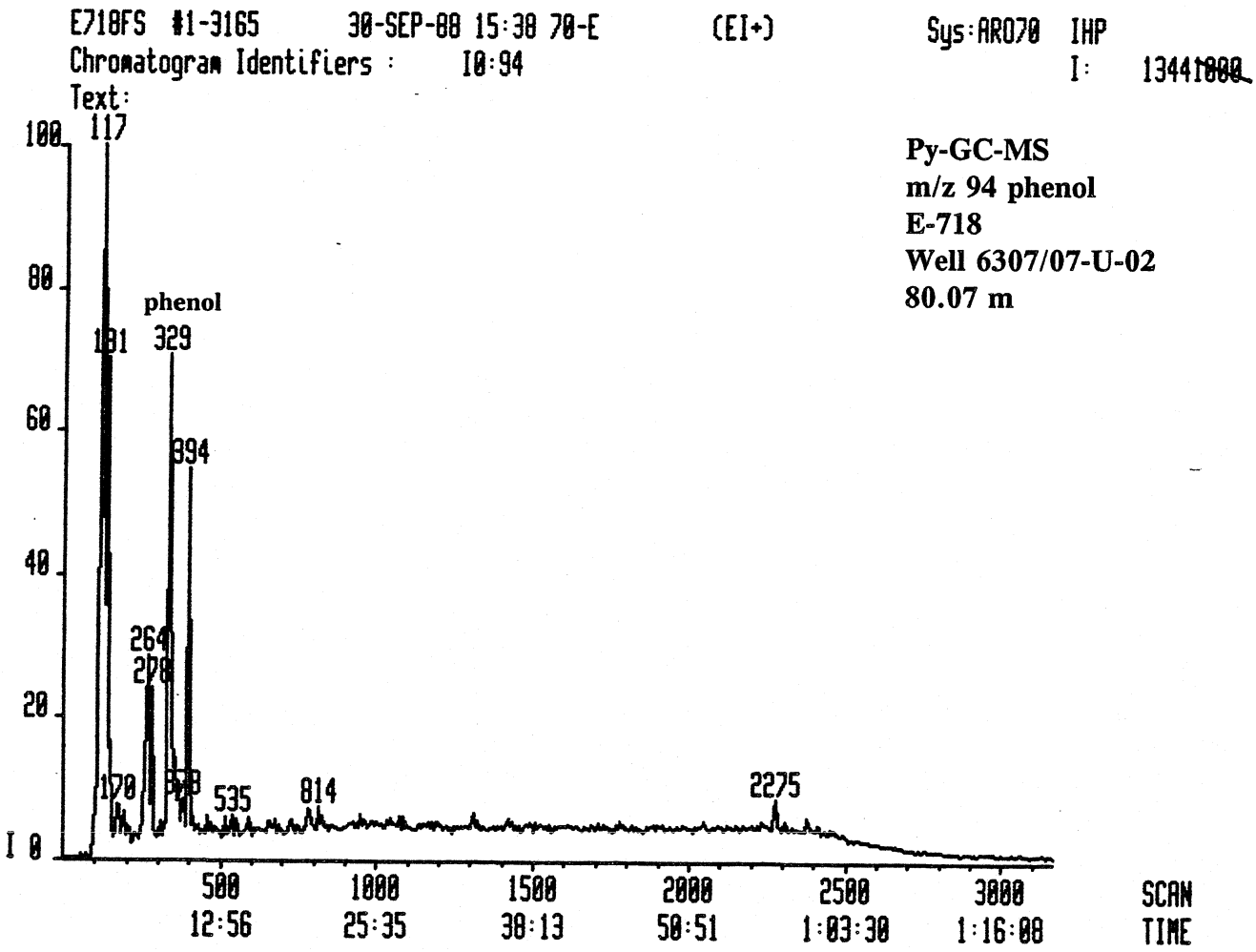

E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : J0:108 J: 2965000
Text:
Py-GC-MS
m/z 108 methyl phenols
E-619
Well 6307/07-U-02
34.83 m
m+p
o
SCAN
TIME



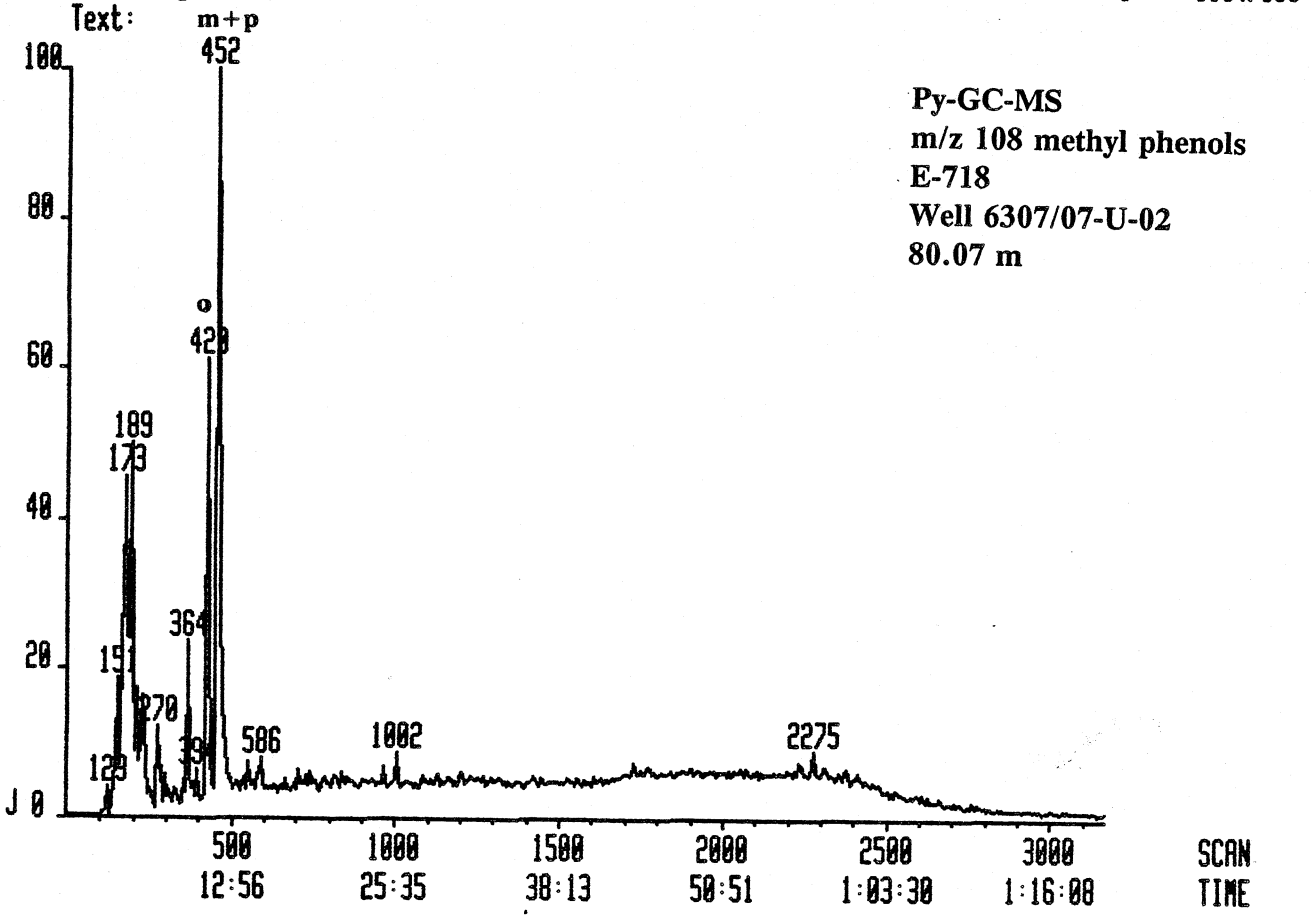
Py-GC-MS
m/z 94 phenol
E-646
Well 6307/07-U-02
47.56 m



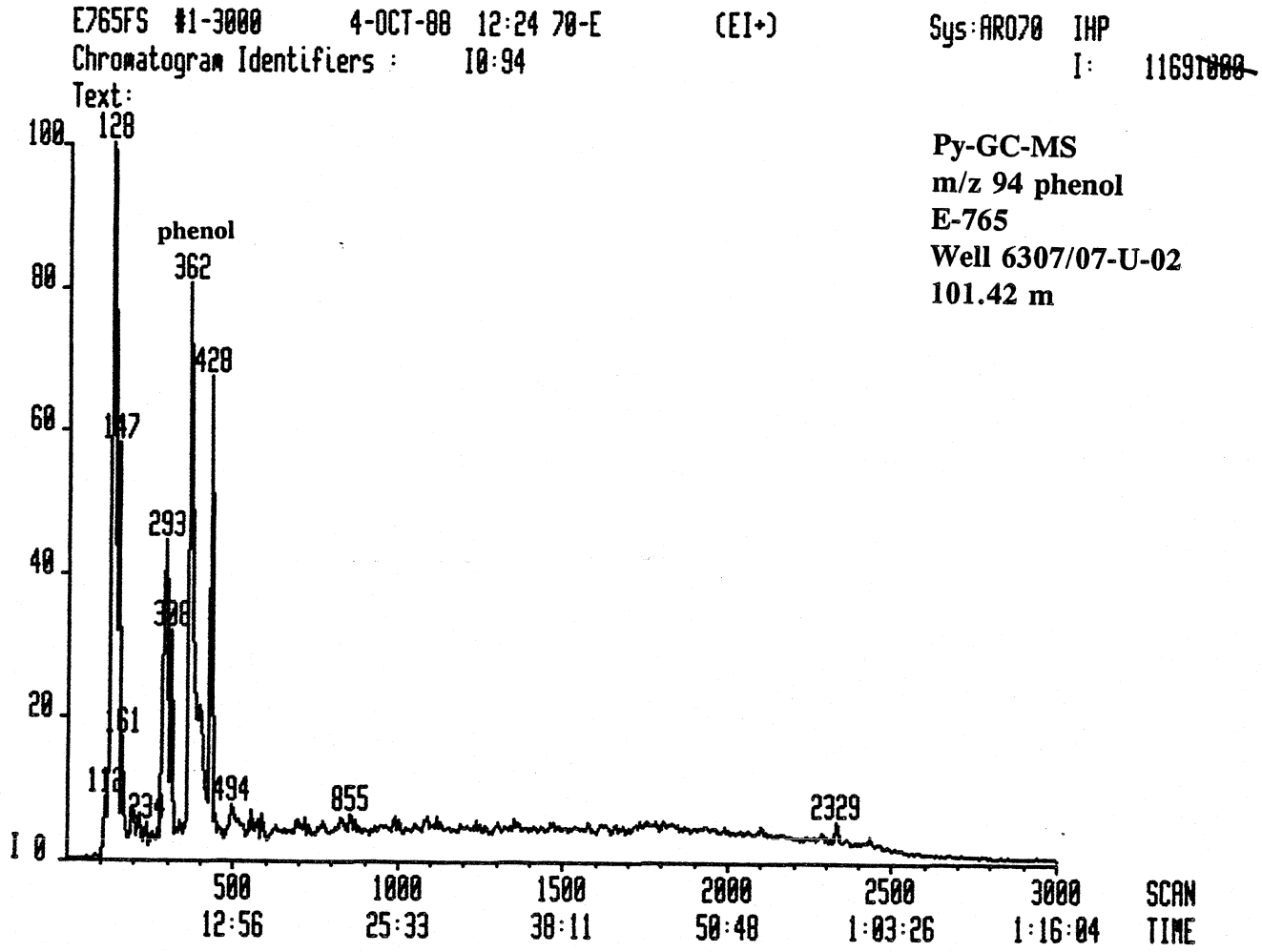
Py-GC-MS
m/z 108 methyl phenols
E-646
Well 6307/07-U-02
47.56 m



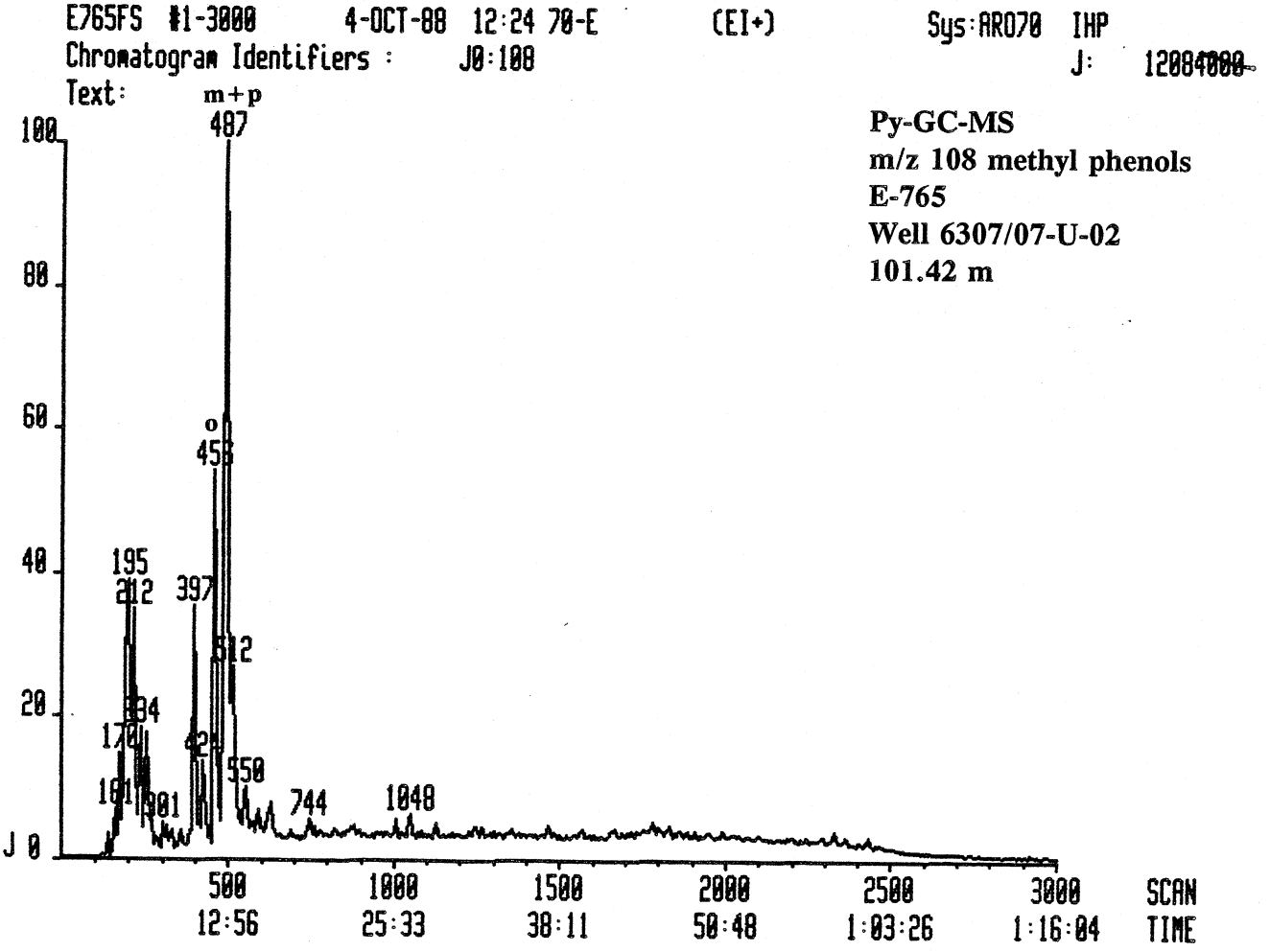
Py-GC-MS
m/z 94 phenol
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 108 methyl phenols
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 94 phenol
E-765
Well 6307/07-U-02
101.42 m



Py-GC-MS
m/z 108 methyl phenols
E-765
Well 6307/07-U-02
101.42 m

Figure III.6.6f

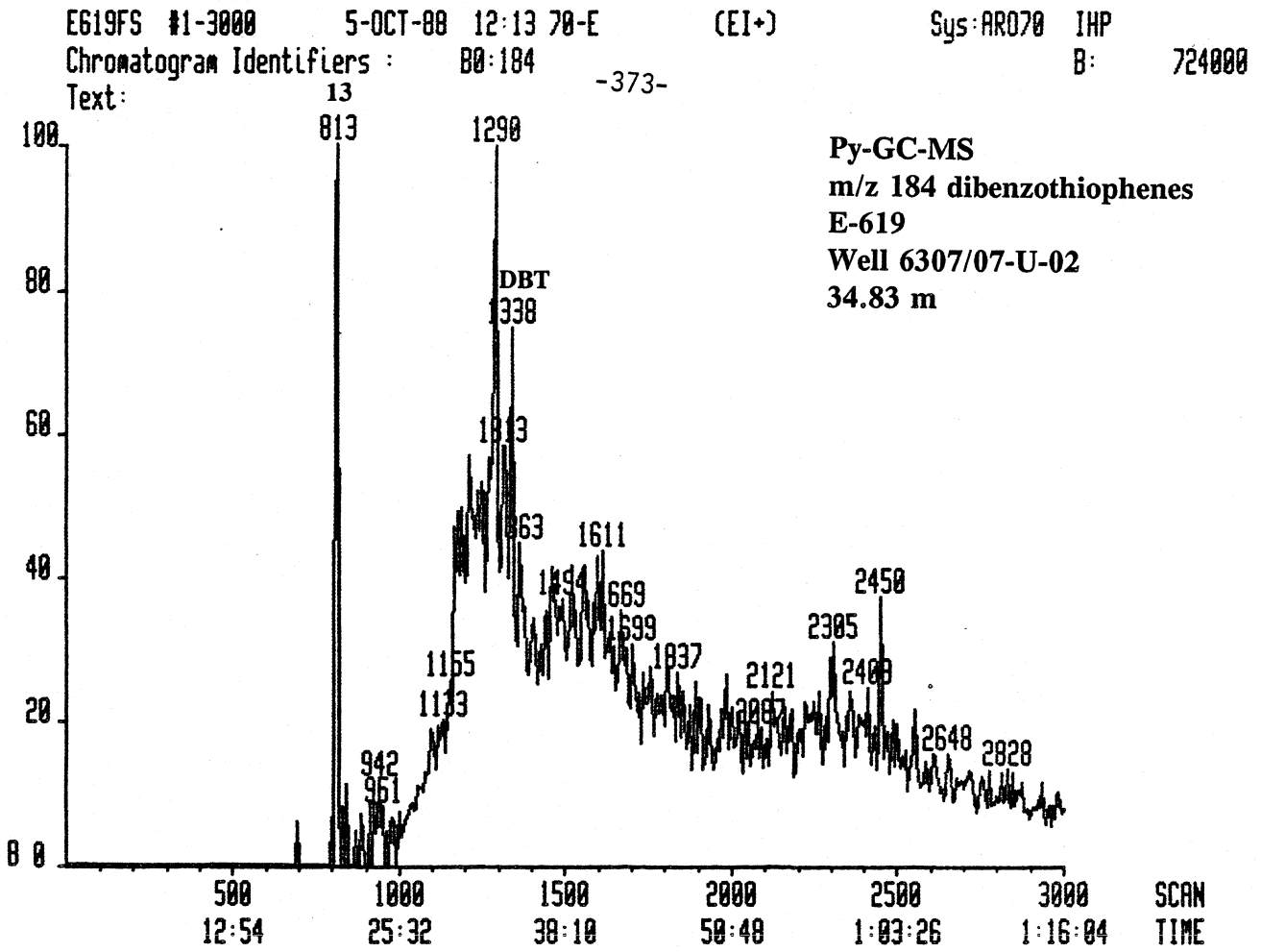
PY-GC-MS

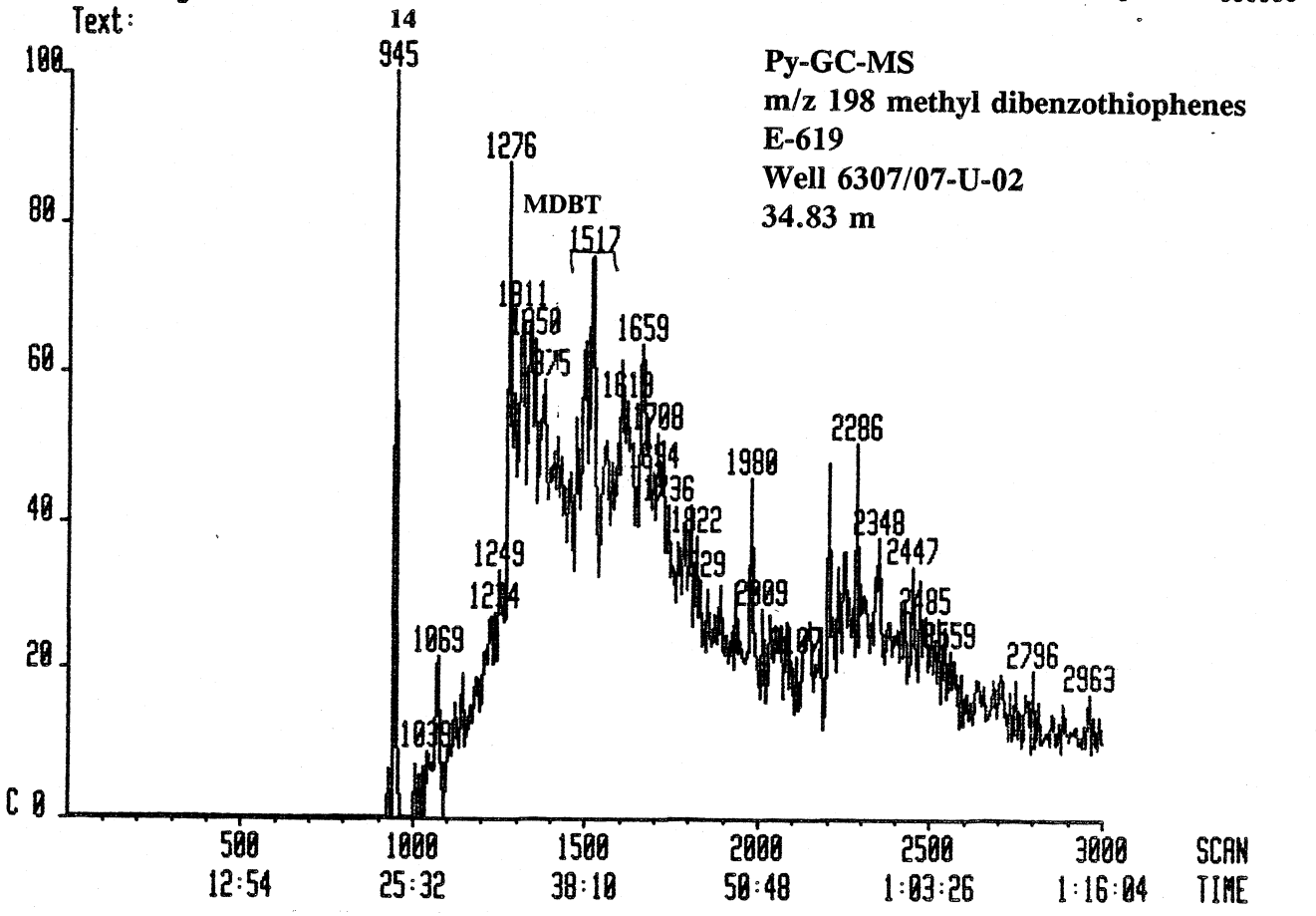
of

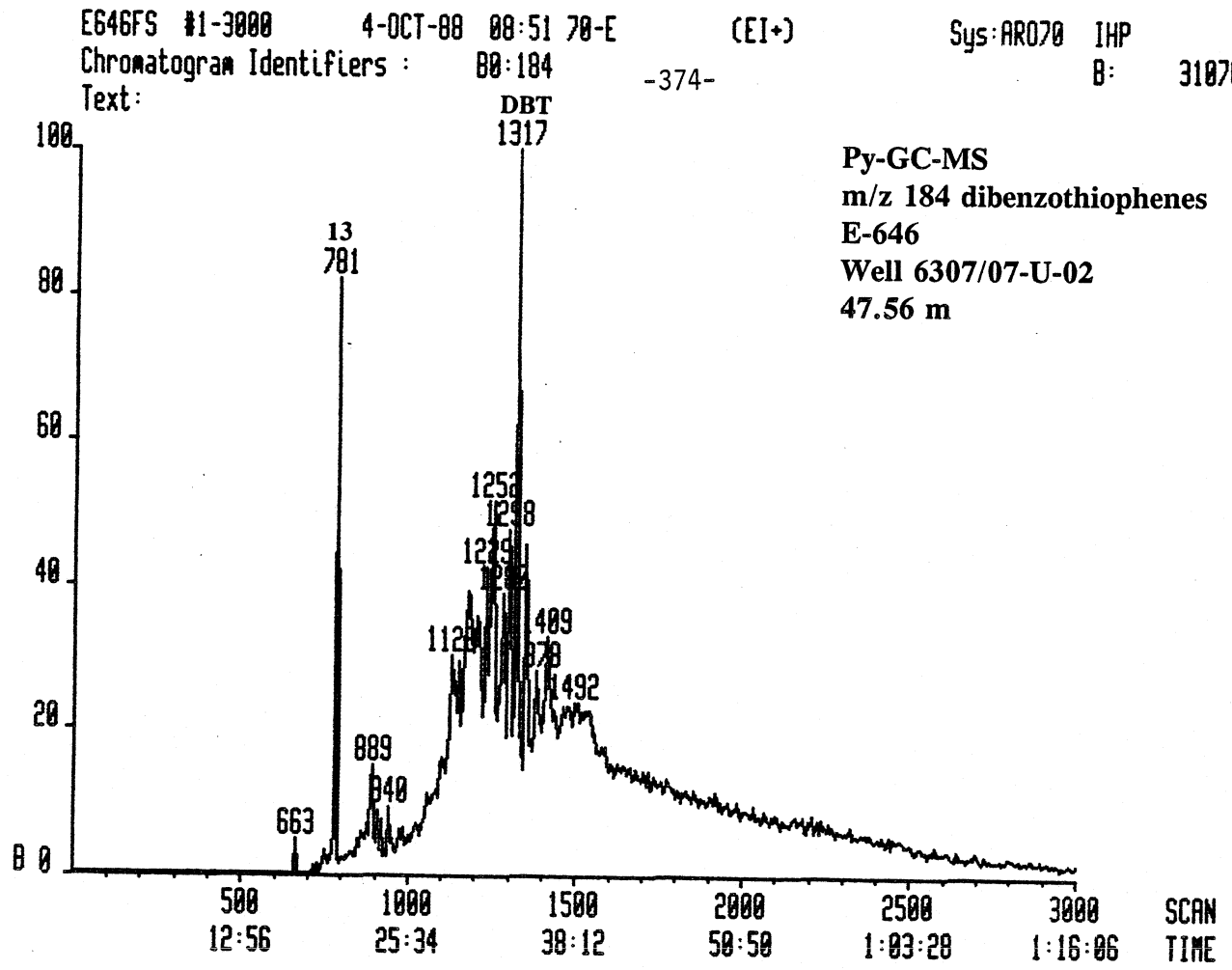
kerogens

m/z 184, 198

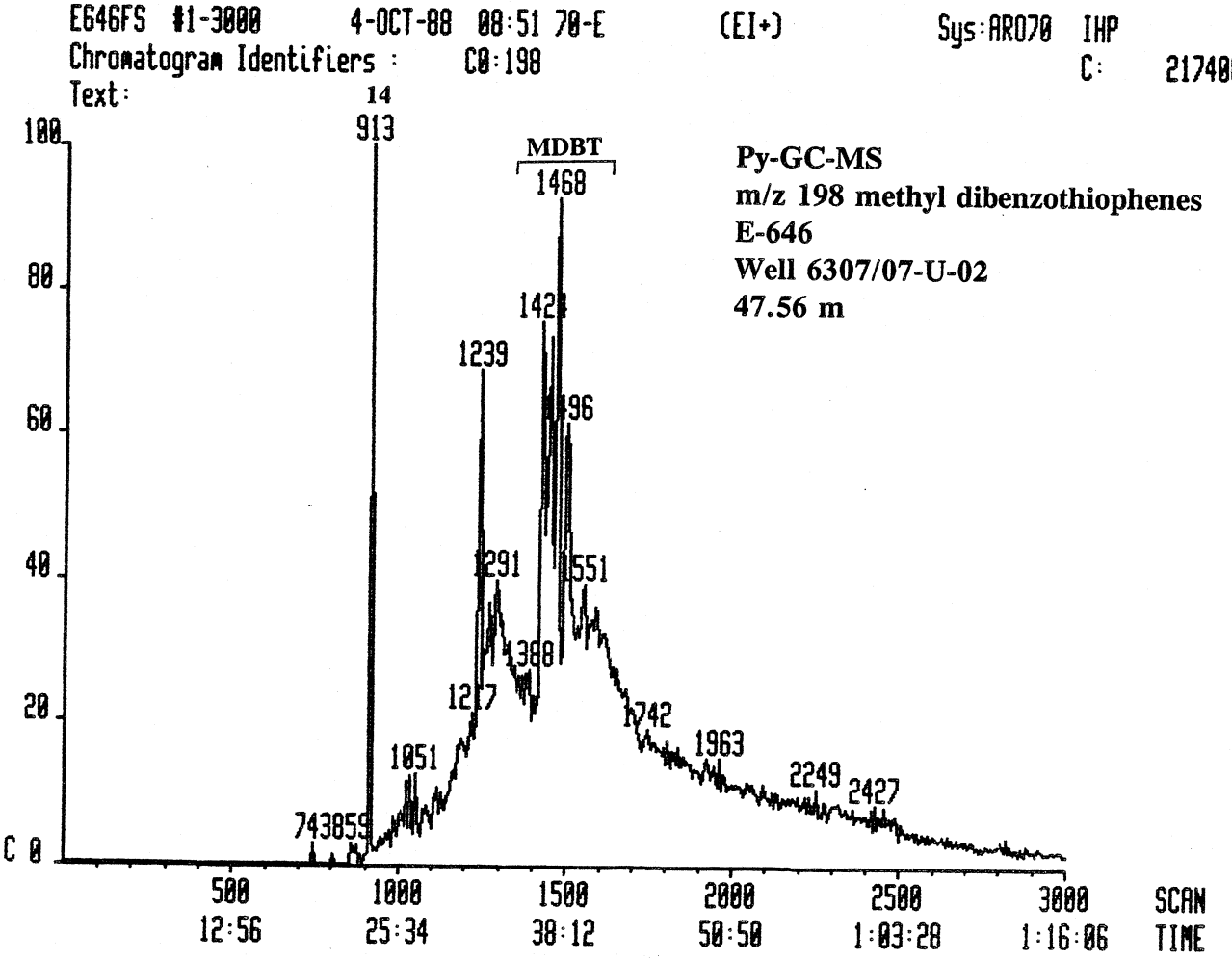
(Further identification of peaks, see section II)


E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : B0:184 B: 724000
Text:
Py-GC-MS
m/z 184 dibenzothiophenes
E-619
Well 6307/07-U-02
34.83 m
DBT
SCAN
TIME

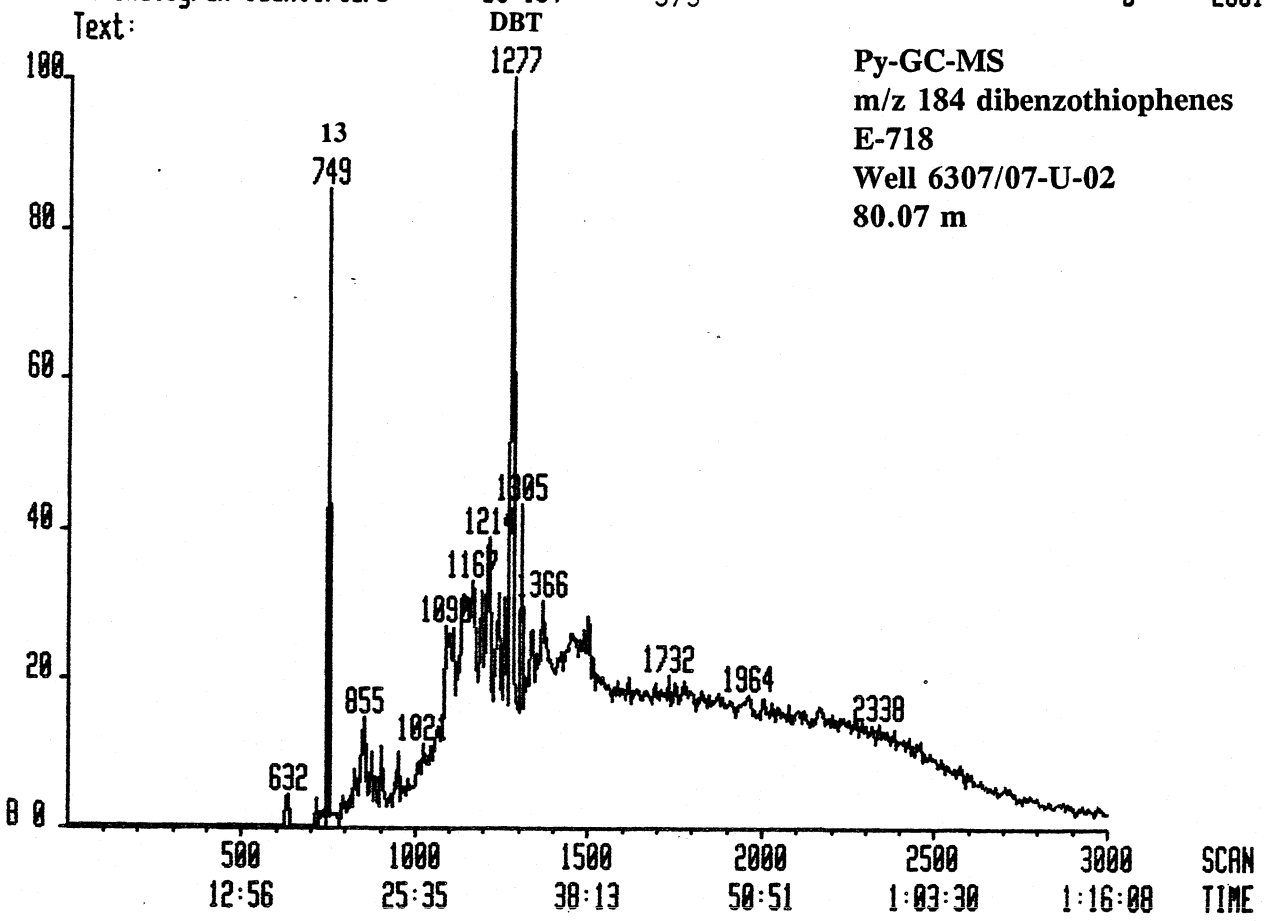

E619FS #1-3000 5-OCT-88 12:13 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:198 C: 530000
Text:
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-619
Well 6307/07-U-02
34.83 m
MDBT
SCAN
TIME

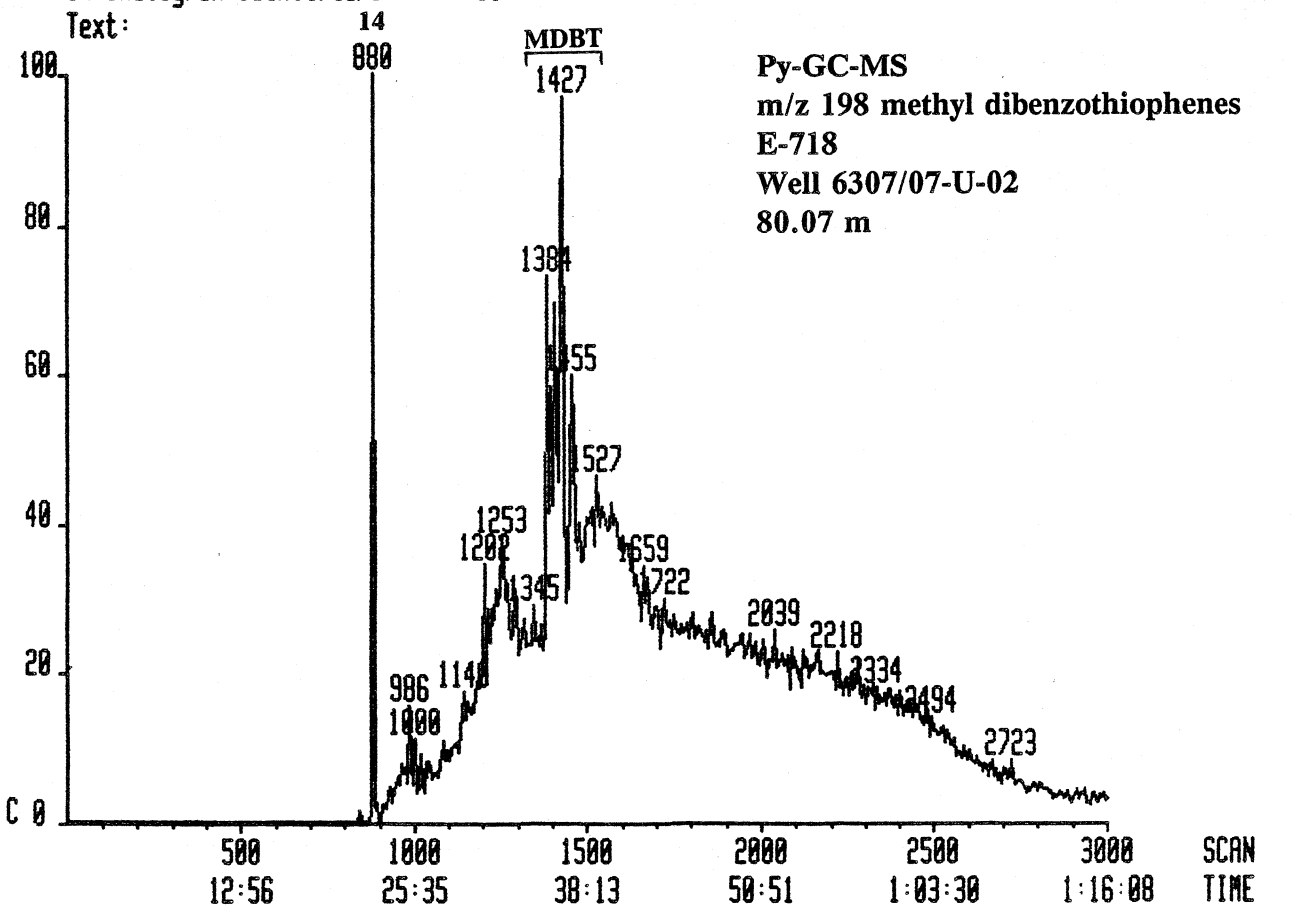


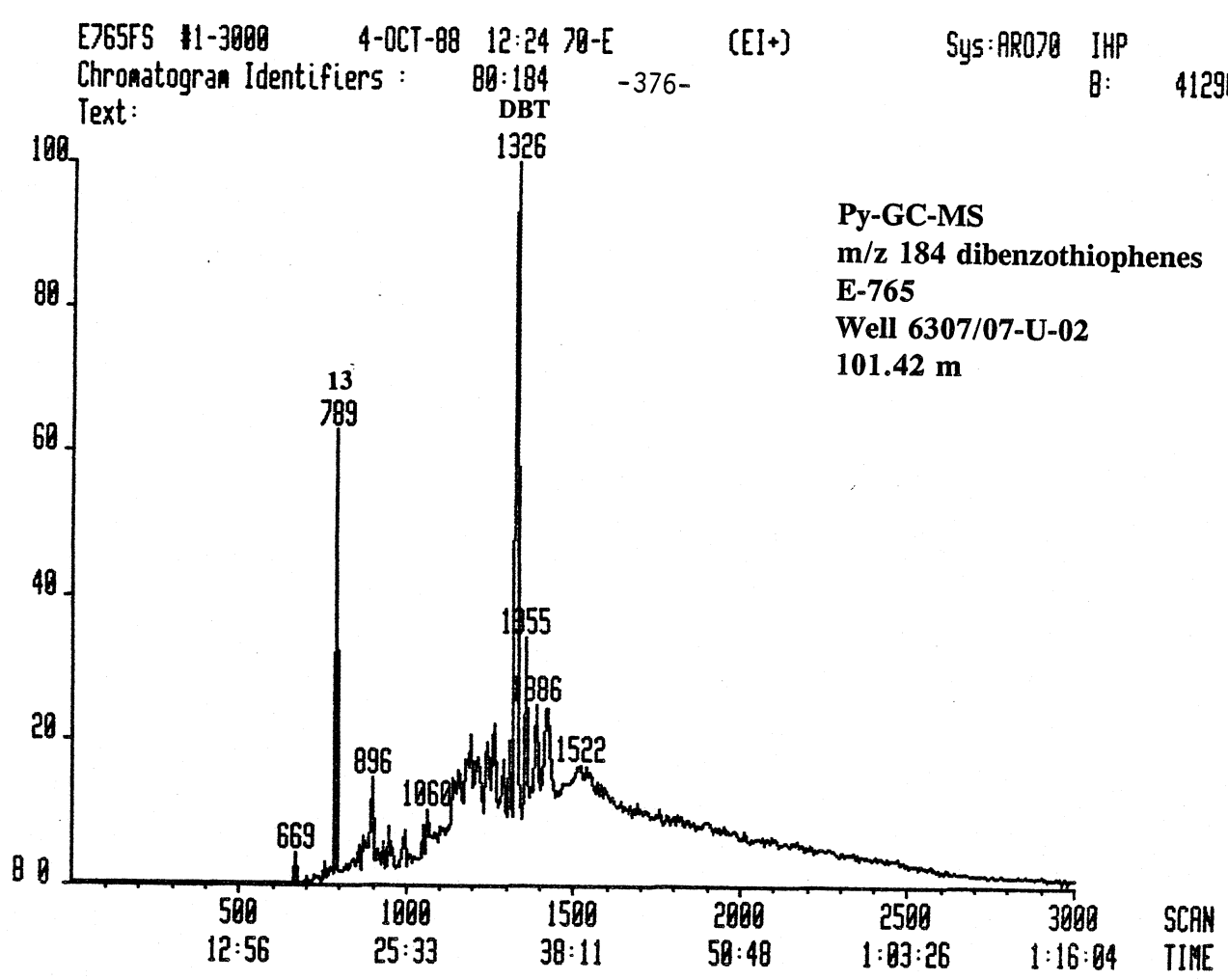
Py-GC-MS
m/z 184 dibenzothiophenes
E-646
Well 6307/07-U-02
47.56 m



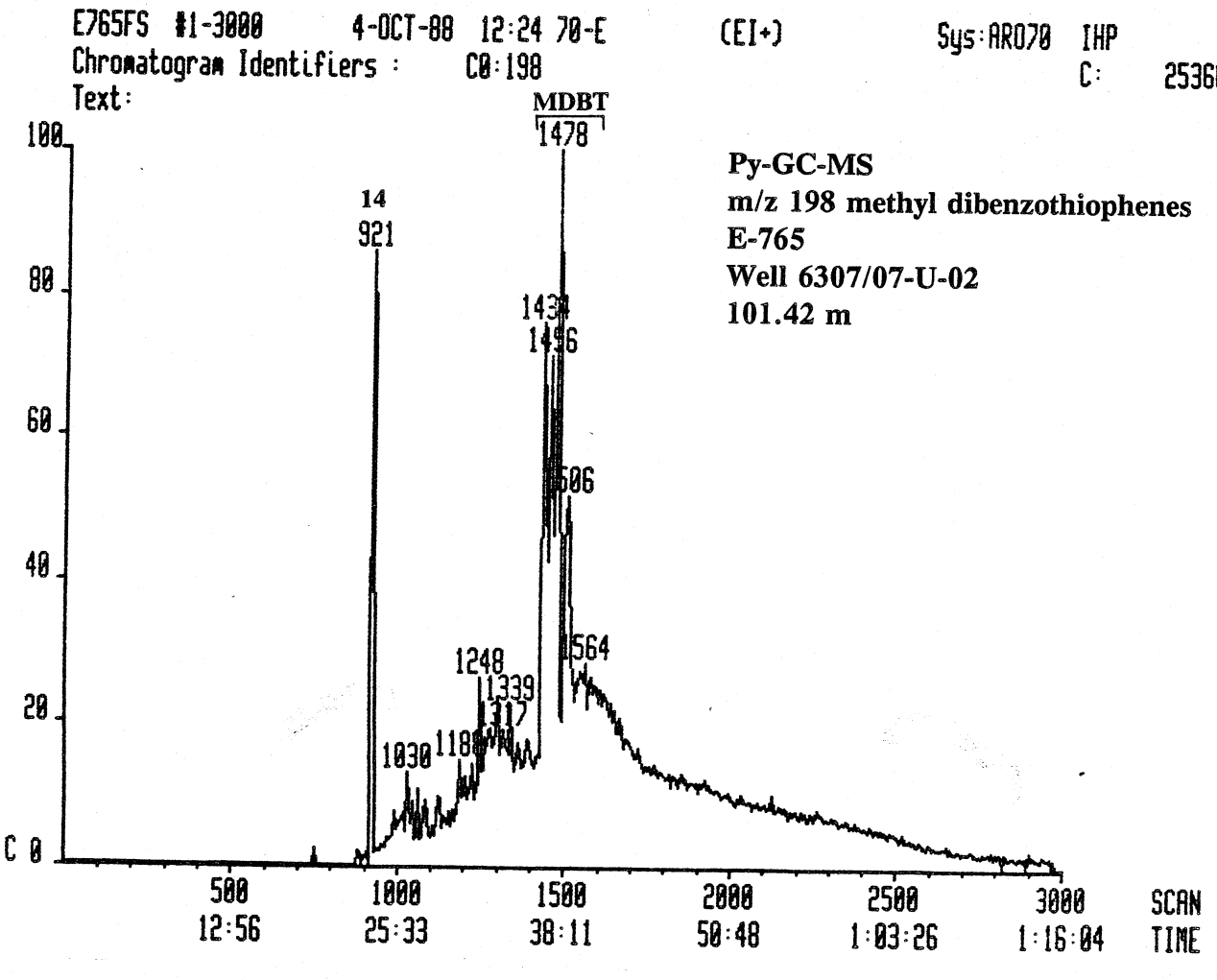
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-646
Well 6307/07-U-02
47.56 m


E718FS #1-3000 30-SEP-88 15:38 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : B0:184 B: 2661000
Text:
DBT
1277
13
749
1305
1214
1167
1098
366
1732
1964
2338
855
1021
632
100
80
60
40
20
B 0
500 1000 1500 2000 2500 3000 SCAN
12:56 25:35 38:13 50:51 1:03:30 1:16:00 TIME
Py-GC-MS
m/z 184 dibenzothiophenes
E-718
Well 6307/07-U-02
80.07 m


E718FS #1-3000 30-SEP-88 15:38 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers : C0:198 C: 1793000
Text:
14
880
MDBT
1427
1384
1055
527
1253
1202
1345
1659
1722
2039
2218
2334
2494
2723
986
1000
1148
100
80
60
40
20
C 0
500 1000 1500 2000 2500 3000 SCAN
12:56 25:35 38:13 50:51 1:03:30 1:16:00 TIME
Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-718
Well 6307/07-U-02
80.07 m



Py-GC-MS
m/z 184 dibenzothiophenes
E-765
Well 6307/07-U-02
101.42 m



Py-GC-MS
m/z 198 methyl dibenzothiophenes
E-765
Well 6307/07-U-02
101.42 m

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Figure III.6.6g

PY-GC-MS

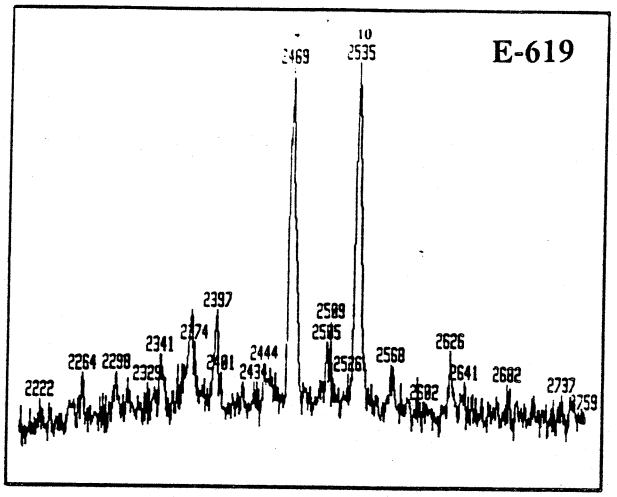
of

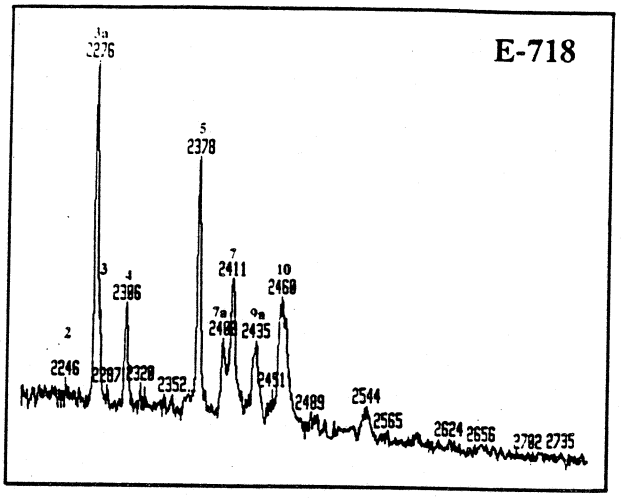
kerogens

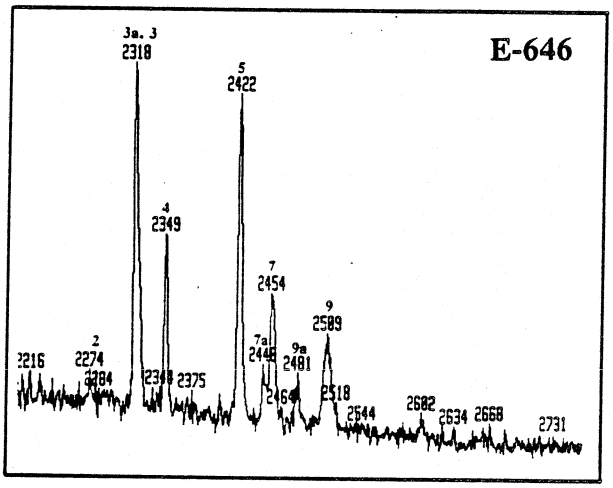
m/z 191

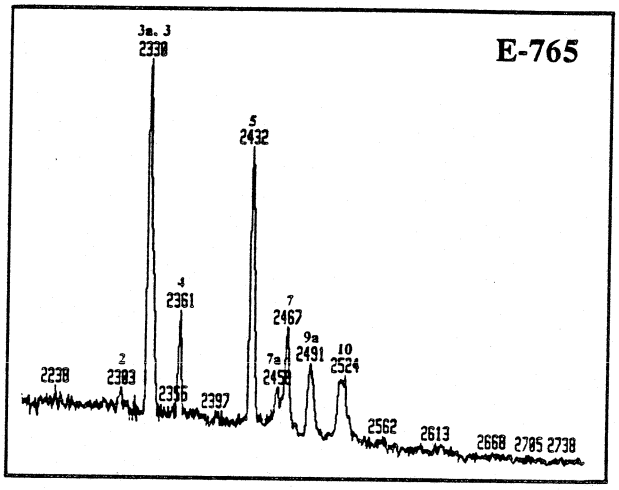
(Further identification of peaks, see section II)

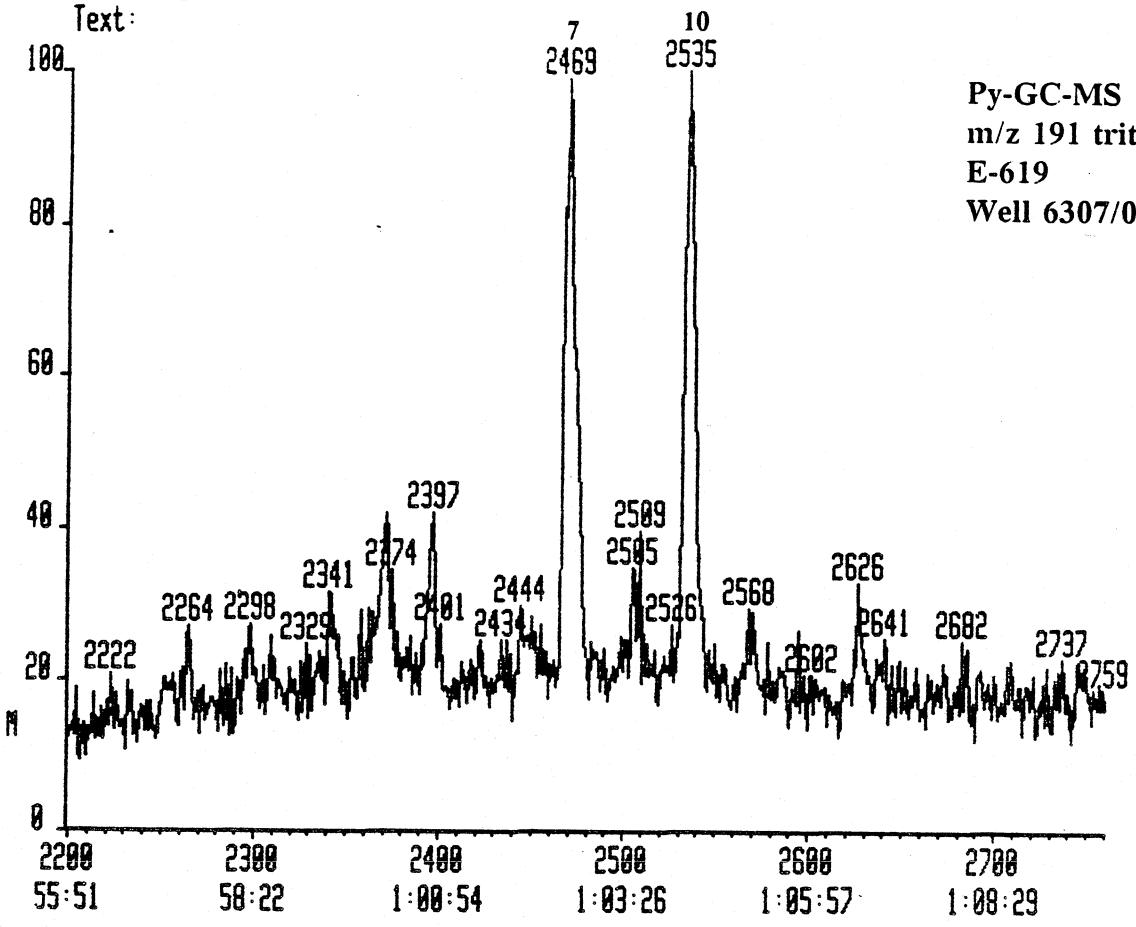
m/z 191 Py-GC-MS Core 6307/07-U-02

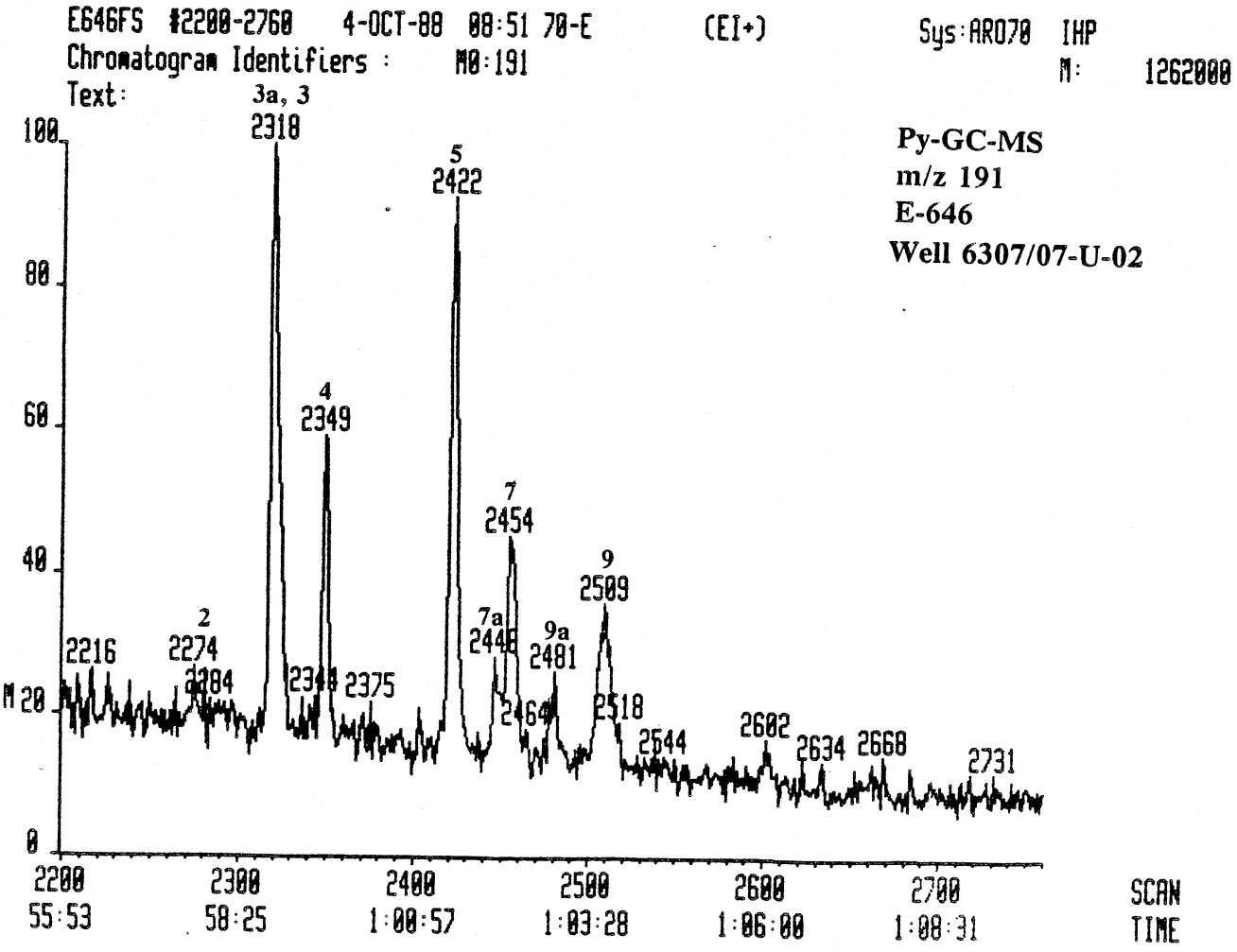


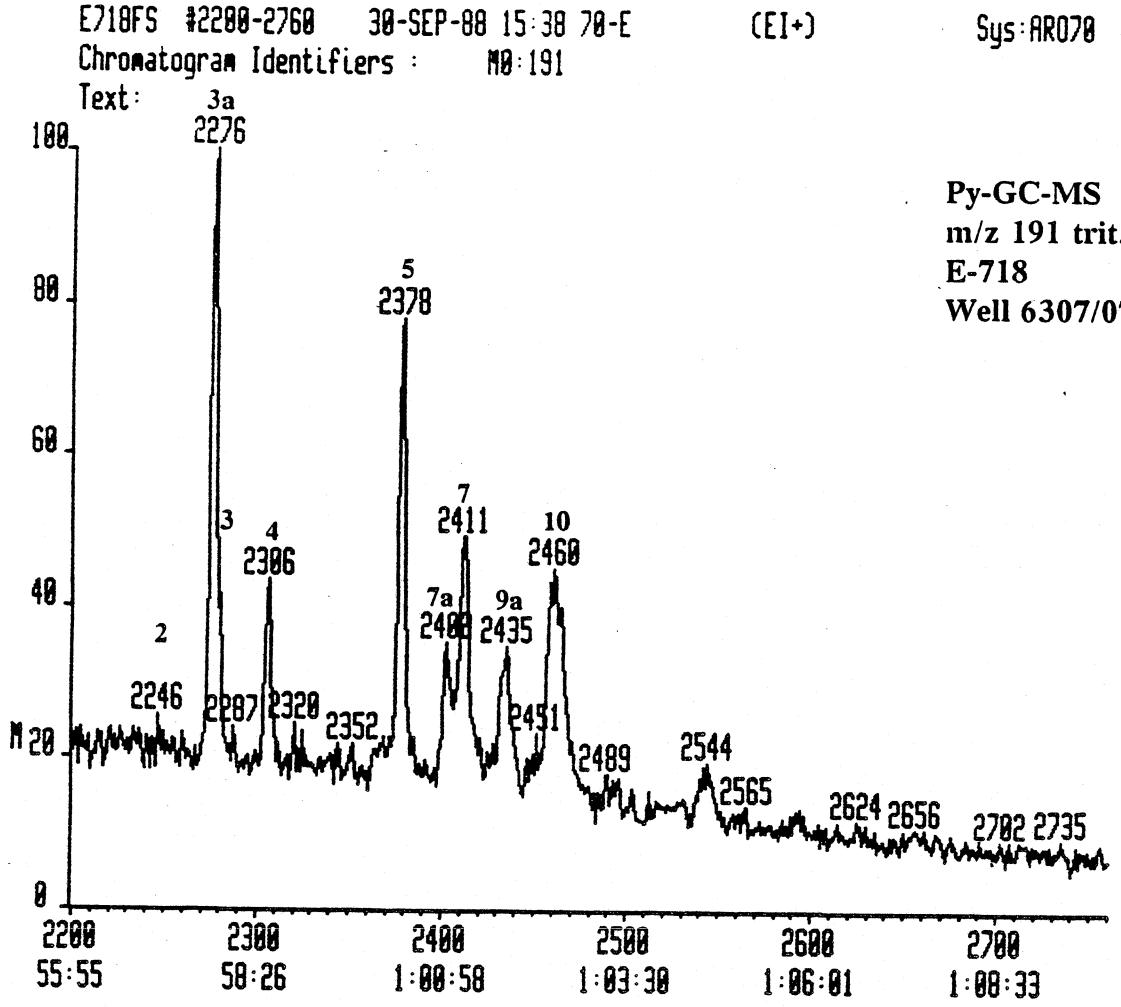




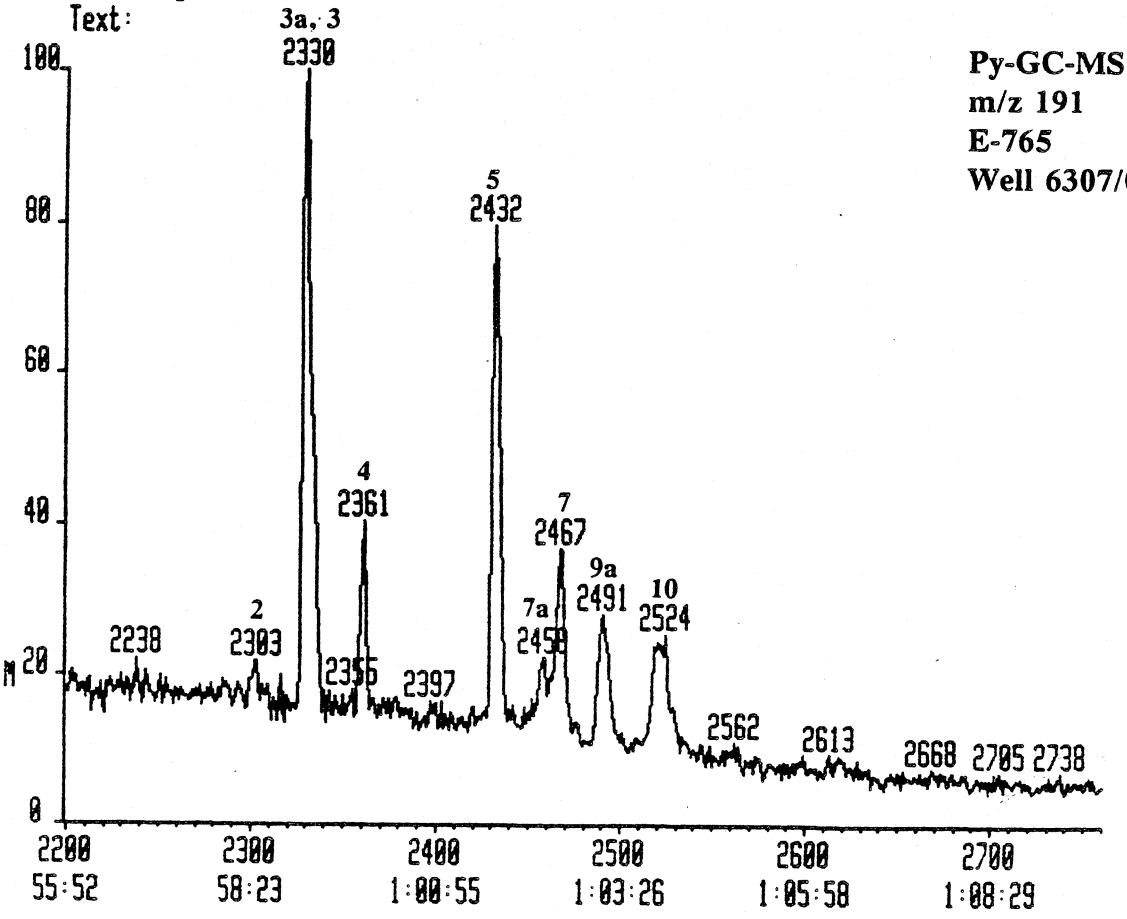



E619FS #2200-2760 5-OCT-88 12:13 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : M0:191
M: 1731000
Text:
Py-GC-MS
m/z 191 triterpanes
E-619
Well 6307/07-U-02
SCAN TIME
55:51 58:22 1:00:54 1:03:26 1:05:57 1:08:29


E646FS #2200-2760 4-OCT-88 08:51 70-E (EI+)
Sys:AR070 IHP
Chromatogram Identifiers : M0:191
M: 1262000
Text:
Py-GC-MS
m/z 191
E-646
Well 6307/07-U-02
SCAN TIME
55:53 58:25 1:00:57 1:03:28 1:06:00 1:08:31



Py-GC-MS
m/z 191 trit.
E-718
Well 6307/07-U-02



Py-GC-MS
m/z 191
E-765
Well 6307/07-U-02

IKU SINTEF-GRUPPEN

III.7 CORE 6408/12-U-01

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III.7.2 Huminite reflectance histograms

TABLES

Core 6408/12-U-01

Table III.7.1 *Analytical programme, follow-up analyses Argillaceous rocks*

IKU no.	Depth (m)	HI	TOC	1 VI	2 TAI/ SCI	3 Extr.	4 MPLC	5 CGC-SAT	6 CGC-ARO	7 Urea add.	8 CGC/ cycl	9 CGC n-alk	10 GC-MS Br./cycl	11 PY-GC-MS (ker)	12 $\delta^{13}C$ (ker)	13 δD (ker)
E-090	30.62	198	8.80			X	X			X			X			
E-092	31.92			X												

IKU SINTEF-GRUPPEN

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6408/12-U-01
Date : 88.10.12

Table III.7.2a TABLE OF GAS RESULTS

Headspace gas (µl gas pr. kg rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0067	20.00	159	0	0	0	0	0	159	0	0.0	
E0082	25.47	0	0	0	0	0	0	0	0		
E0093	31.62	0	0	0	0	0	0	0	0		
E0094	32.86	29	0	0	0	0	15	29	0	0.0	

Table III.7.2b TABLE OF GAS RESULTS

Occluded gas (µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0067	20.00	244	22	0	0	0	0	266	22	8.3	
E0082	25.47	365	46	27	0	0	0	438	73	16.7	
E0093	31.62	213	31	5	0	0	0	249	36	14.5	
E0094	32.86	362	34	6	0	0	0	402	40	10.0	

Table III.7.2c TABLE OF GAS RESULTS

Summation of Headspace and Occluded gas

(µl gas pr. kg dry rock)

IKUNO	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 --- nC4
E0067	20.00	403	22	0	0	0	0	425	22	5.2	
E0082	25.47	365	46	27	0	0	0	438	73	16.7	
E0093	31.62	213	31	5	0	0	0	249	36	14.5	
E0094	32.86	391	34	6	0	0	15	431	40	9.3	

IKU SINTEF-GRUPPEN

Project no.: 21343424
Location : 6408/12-U-01
Date : 88.10.17

Table III.7.3 DATA FROM CARBON ANALYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	TOC (%)
E0075	BULK	22.54	CORE	4.60
E0079	BULK	23.21	CORE	4.76
E0080	BULK	23.60	CORE	2.81
E0081	BULK	24.38	CORE	3.21
E0082	BULK	25.47	CORE	0.23
E0085	BULK	27.18	CORE	0.39
E0086	BULK	28.37	CORE	3.69
E0087	BULK	28.57	CORE	9.18
E5595	BULK	29.75	CORE	1.70
E5596	BULK	30.00	CORE	1.19
E0090	BULK	30.62	CORE	8.80
E0090	EOM	30.62	CORE	6.87
E5599	BULK	30.85	CORE	14.10
E5600	BULK	31.00	CORE	3.05
E5603	BULK	31.50	CORE	4.77
E5605	BULK	32.00	CORE	17.60
E0097	BULK	34.46	CORE	0.24

Table III.7.4 DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	S3 (mg/g rock)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYG. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
E0075	BULK	22.54	CORE	0.04	2.83	5.18	4.60	61	112	2.87	0.01	431*
E0079	BULK	23.21	CORE	0.04	3.34	6.78	4.76	70	142	3.38	0.01	432*
E0080	BULK	23.60	CORE	0.02	1.38	10.19	2.81	49	362	1.40	0.01	437*
E0081	BULK	24.38	CORE	0.03	1.73	12.46	3.21	53	388	1.76	0.01	432*
E0082	BULK	25.47	CORE	0.00	0.00	0.41	0.23	0	178	0.00	0.00	237**
E0085	BULK	27.18	CORE	0.01	0.07	3.11	0.39	17	797	0.08	0.12	439**
E0086	BULK	28.37	CORE	0.05	2.70	3.37	3.69	73	91	2.75	0.01	431*
E0087	BULK	28.57	CORE	0.10	0.29	5.84	9.18	3	63	0.39	0.25	387**
E5595	BULK	29.75	CORE	0.04	1.52	1.06	1.70	89	62	1.56	0.02	427*
E5596	BULK	30.00	CORE	0.03	1.29	2.80	1.19	108	235	1.32	0.02	435*
E0090	BULK	30.62	CORE	0.24	17.47	1.75	8.80	198	19	17.71	0.01	425
E5599	BULK	30.85	CORE	0.24	15.86	4.18	14.10	112	29	16.10	0.01	425
E5600	BULK	31.00	CORE	0.08	2.90	0.94	3.05	95	30	2.98	0.02	427*
E5603	BULK	31.50	CORE	0.09	3.79	1.72	4.77	79	36	3.88	0.02	427*
E5605	BULK	32.00	CORE	0.39	26.95	4.53	17.60	153	25	27.34	0.01	425
E0097	BULK	34.46	CORE	0.00	0.04	0.30	0.24	16	125	0.04	0.00	508**

* Low S1 and/or S2. PI not reliable.
** Tmax not reliable due to ill-defined or very low S2-peak.

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Project no.: 21343424
Location : 6408/12-U-01
Date : 88.10.17

Table III.7.5a WEIGHT OF CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ROCK EXTR. (g)	EOM (mg)	ASPH (mg)	SAT HC (mg)	ARO HC (mg)	POLAR COMP. (mg)	HC (mg)	NONHC (mg)	TOC (%)
E0090	EOM	30.62	CORE	79.9	244.0	126.6	21.1	14.8	42.0	35.9	208.1	6.87

Table III.7.5b CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm of rock)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0090	EOM	30.62	CORE	3055	1585	264	186	526	450	2605

Table III.7.5c CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	EOM	ASPH	SAT HC	ARO HC	POLAR COMP.	HC	NONHC
E0090	EOM	30.62	CORE	44.5	23.1	3.8	2.7	7.7	6.5	38.0

Table III.7.5d COMPOSITION OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	ASPH / EOM (%)	SAT / EOM (%)	ARO / EOM (%)	HC / EOM (%)	POLAR / EOM (%)	SAT / ARO x 100	HC / NONHC x 100
E0090	EOM	30.62	CORE	51.9	8.6	6.1	14.7	17.2	142.2	17.3

Table III.7.6a *Molecular ratios from peak heights in mass chromatograms. Hopenes/hopanes m/z 191. Branched/cycloalkane fractions in extracts. Core 6408/12/U-01*

Sample no.	Depth (m)	C_{27}-17β/17α[1]	C_{27}-18α/17α[2] (Tm/Ts)	αβ/αβ+ββ[3]	ββ/αβ+ββ[4]	$C_{30:1}/C_{30}$-αβ[5]	C_{27}-17β/	C_{30}-ββ/	C_{31}-ββ[6]
E-90	30.62	3.9	0.6	0.43	0.57	0.68	35.5	41.3	23.1

1 Peak 4/3
2 Peak 2/3
3 Peak 8/8+12, C_{30}-isomers
4 Peak 12/8+12
5 Peak 9/8
6 % distribution of peaks 4/12/13

Table III.7.6b *Molecular ratios from heights in mass chromatograms. Sterenes/steranes m/z 217, 257. Branched/cycloalkane fractions in extracts. Core 6408/12-U-01*

Sample no.	Depth (m)	C_{29}-sterane isomers[1]	$\%C_{27}$	$/C_{28}/$	C_{29}[2]	Rearr.sterenes/steranes[3]
E-90	30.62	26.2	6.0	13.8	80.2	11.6

1 Peak 6/6+7, % (βαα20R+αββ20R)(βαα20R+αββ20R+ααα20R)
2 % distribution of peaks 3/5/7
3 Intensity in m/z 257/m/z 217

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Well number: 6408/12-U-01
Reference number:21.3434.24

Table III.7.7 HUMINITE REFLECTANCE DATA

IKU NO	LOCATION	DEPTH (M)	VITRINITE REFLECTANCE	REL RAT	STANDARD DEVIATION	FLUORESCENCE
E-092	------	31.92	0.29 (30)	G	0.07	1?

REL RAT (Reliability Rating): G = Good; F = Fair; P = Poor;
LRV = Low Reflecting Vitrinite; HRV = High Reflecting Vitrinite; LRM = Low Reflecting Material; I = Inertinite.

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FIGURES

IKU SINTEF-GRUPPEN

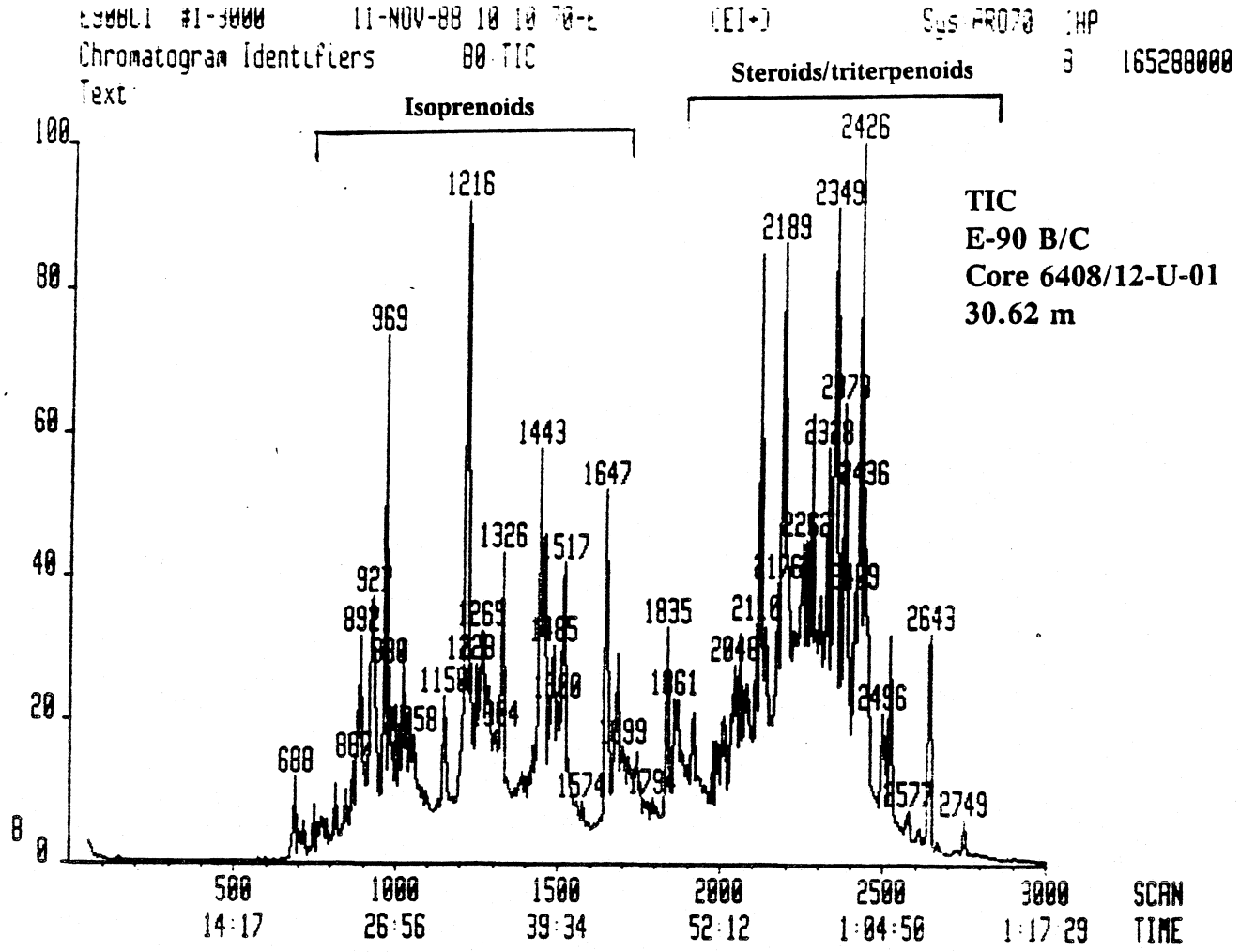
FIGURE III.7.1

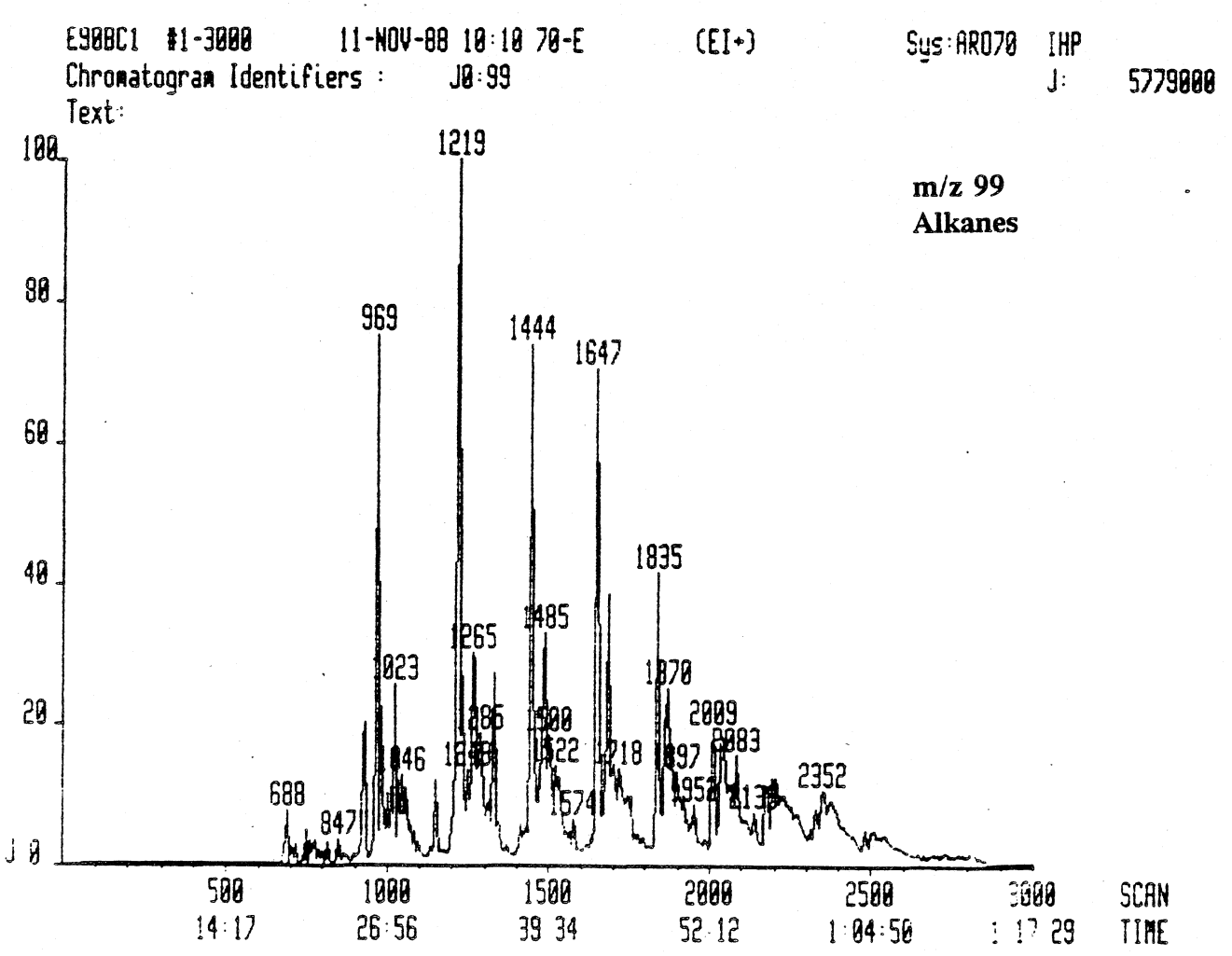
GC-MS of branched/cycloalkanes in extract

TIC, m/z 99, 113, 183, 191, 217, 257, 231

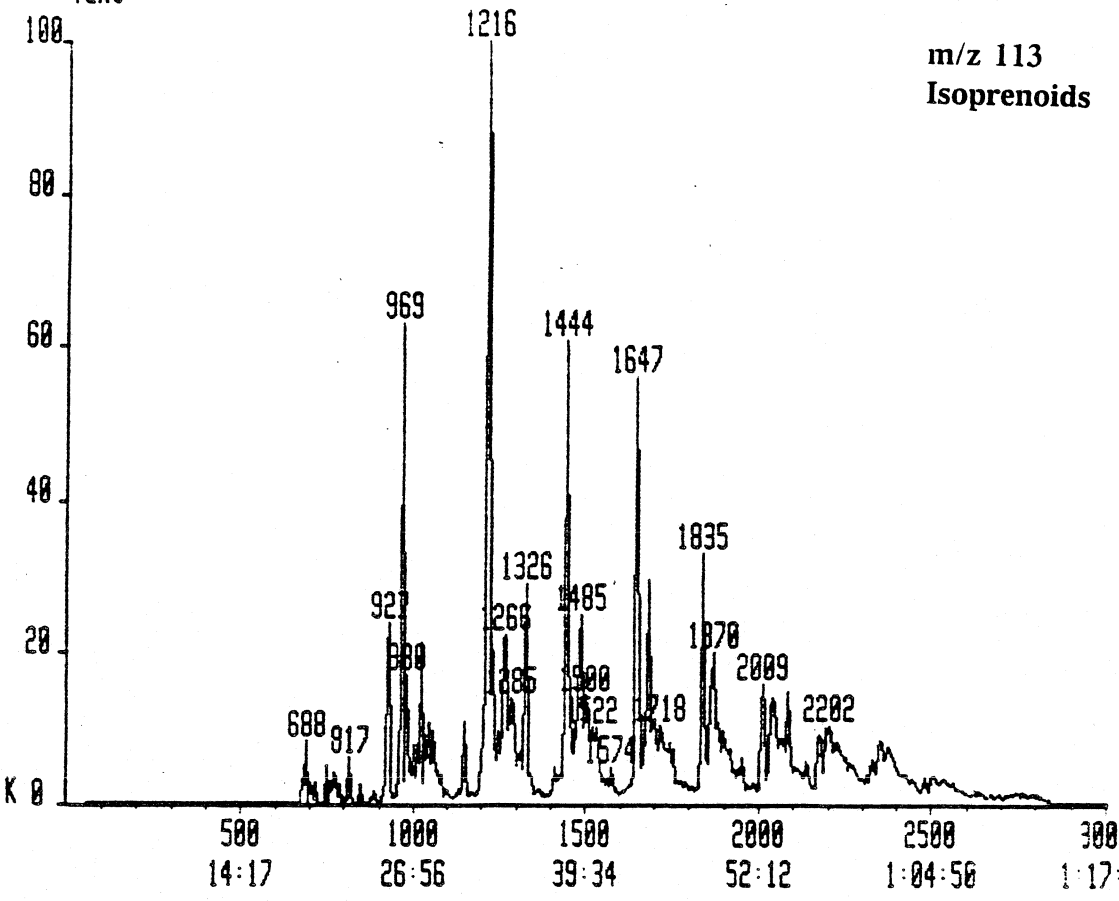
(Identification of peaks, see section II)

E-90


Isoprenoids
Steroids/triterpenoids
TIC
E-90 B/C
Core 6408/12-U-01
30.62 m
SCAN
TIME

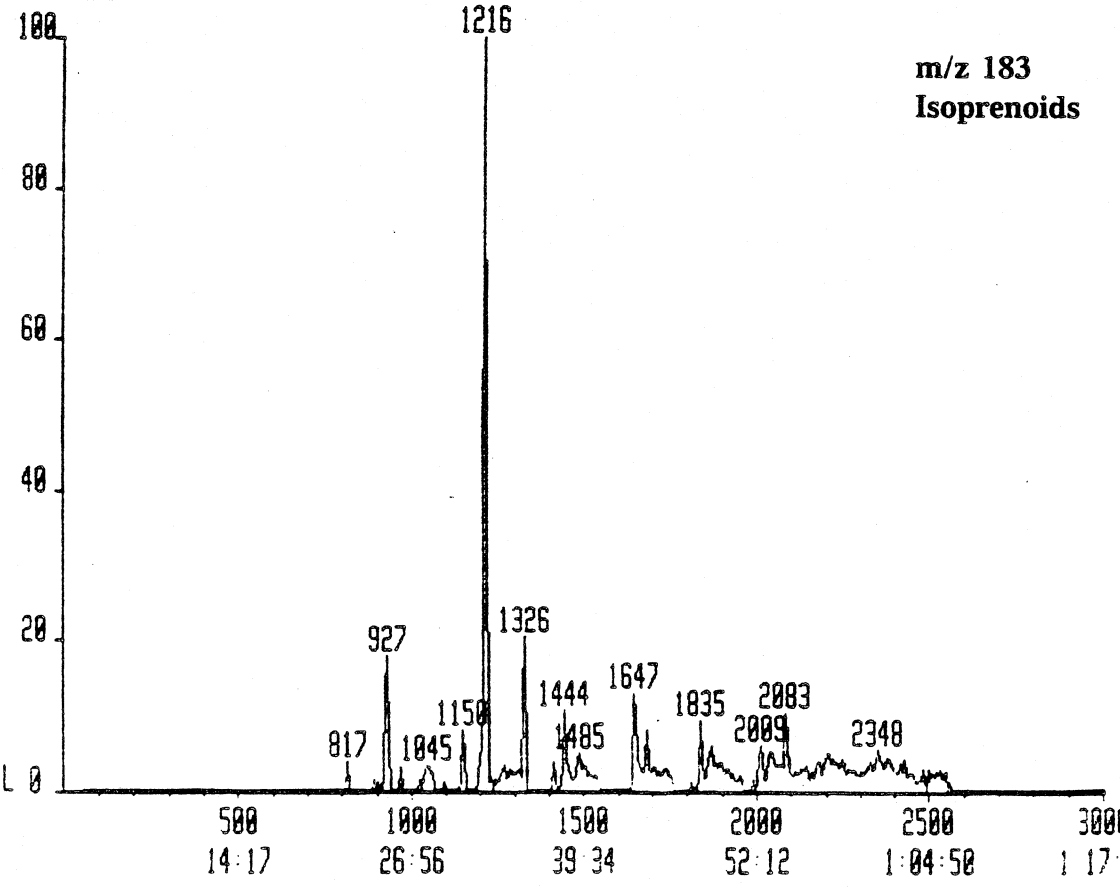

m/z 99
Alkanes
SCAN
TIME

E30BC1 #1-3000 11-NOV-88 10 10 70-E (EI+) Sys AR070 IHP
Chromatogram Identifiers : K0:113 K: 5952000
Text:

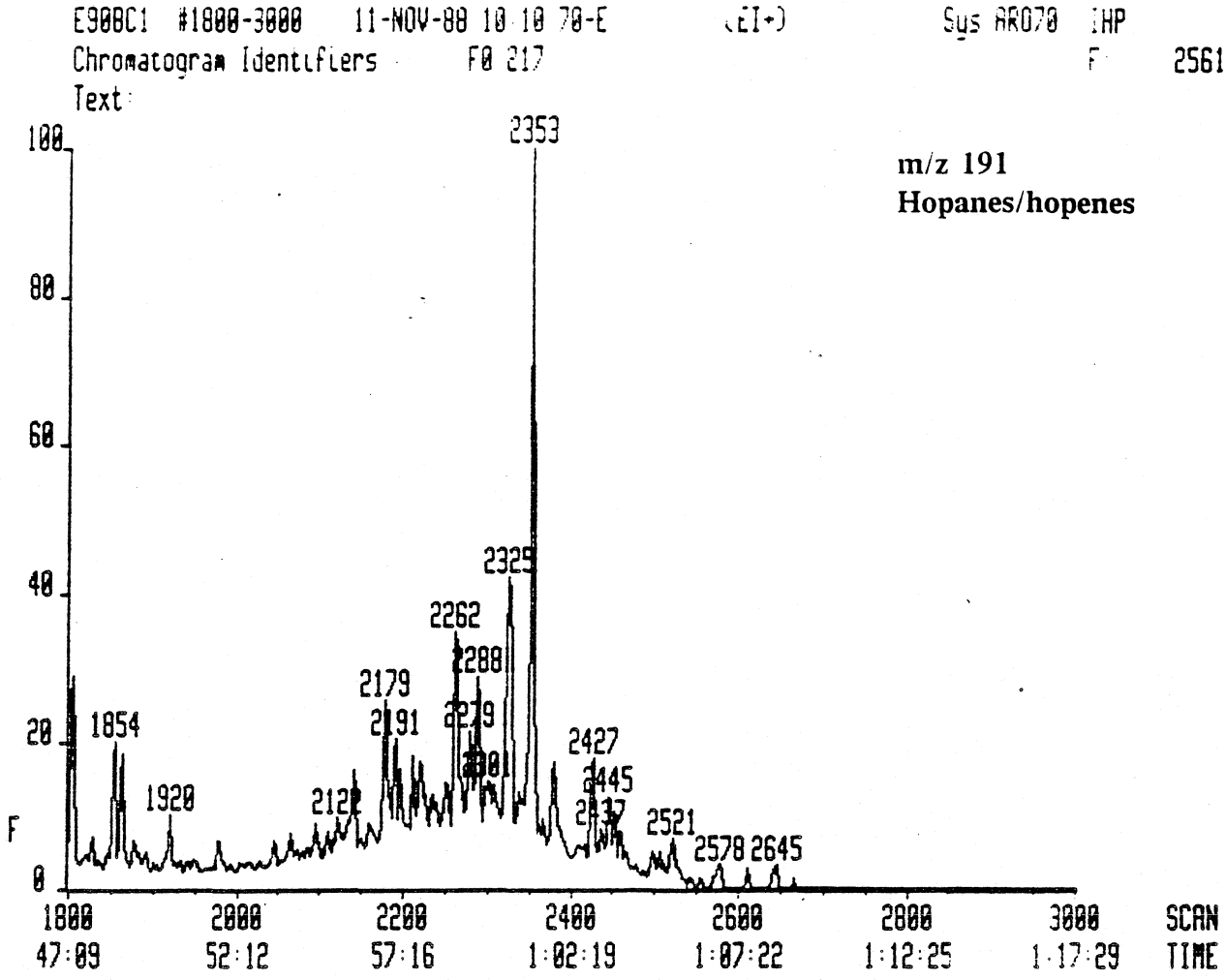


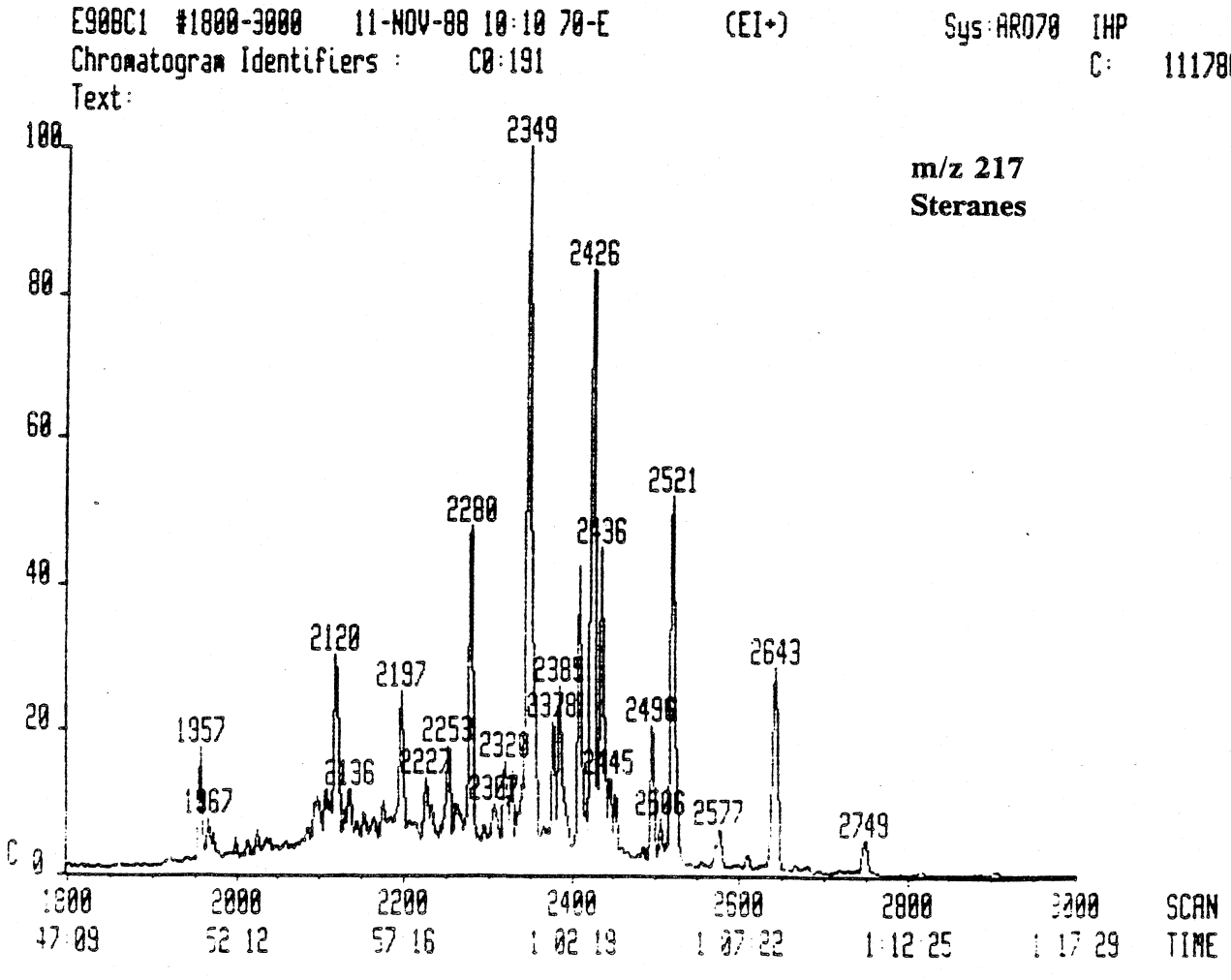
m/z 113
Isoprenoids

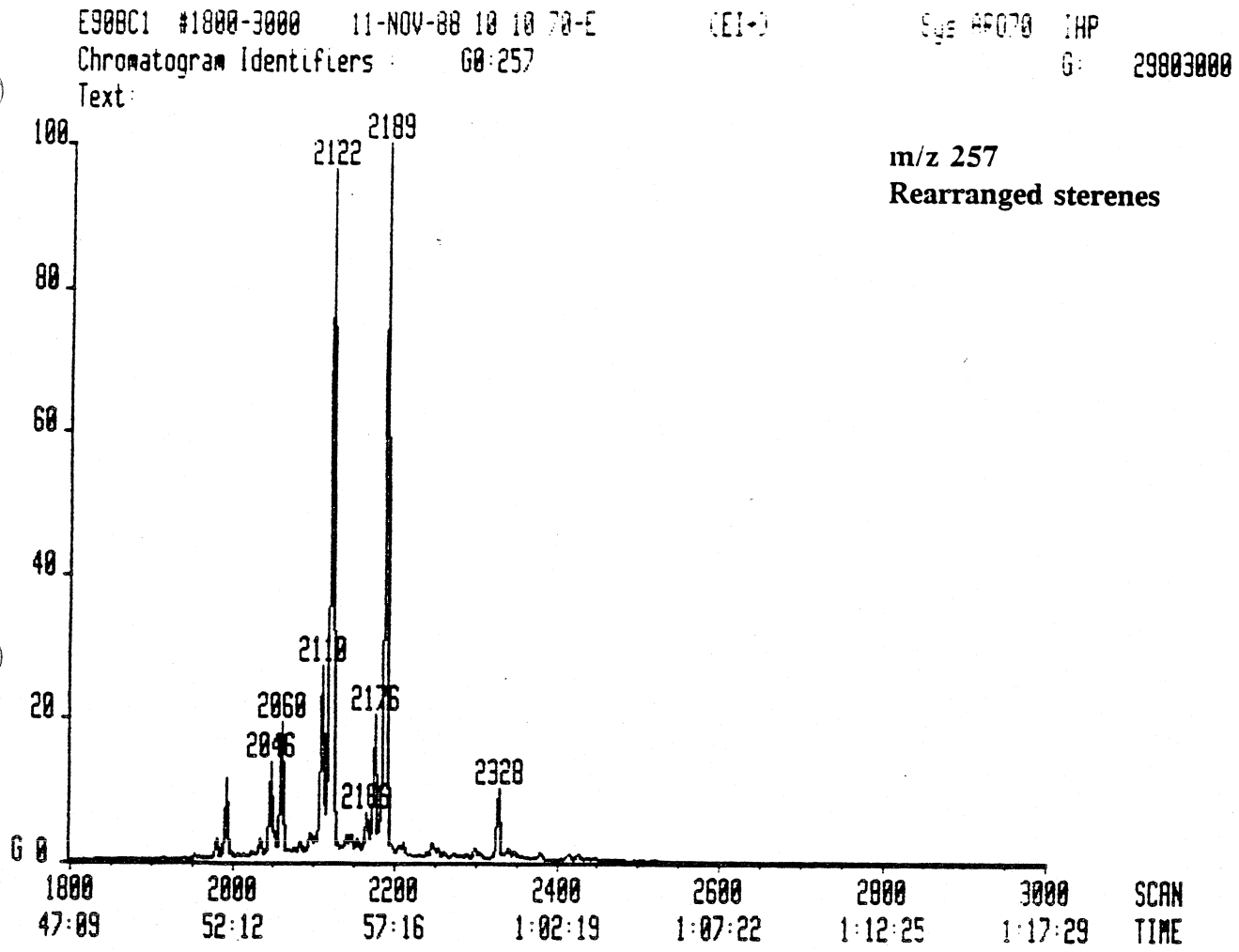
E30BC1 #1-3000 11-NOV-88 10:10 70-E (EI+) Sys AR070 IHP
Chromatogram Identifiers : L0:183 L: 3075000
Text:



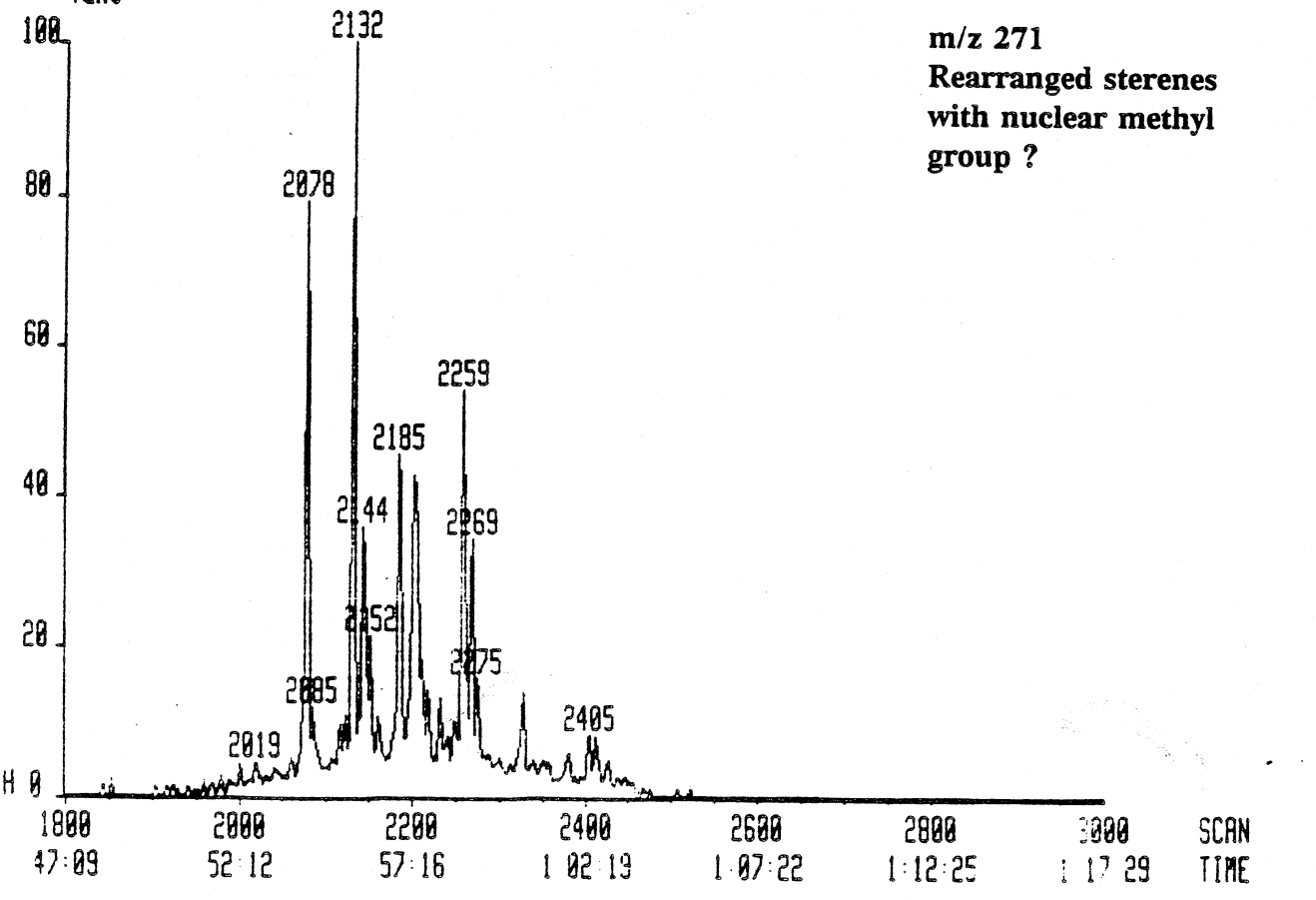
m/z 183
Isoprenoids


E90BC1 #1800-3000 11-NOV-88 10:10 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers F0:217 F: 2561000
Text:
m/z 191
Hopanes/hopenes
2353
2325
2262
2288
2179
2191
2219
1854
1920
2122
2427
2445
2521
2578
2645
F
100
80
60
40
20
0
1800 2000 2200 2400 2600 2800 3000 SCAN
47:09 52:12 57:16 1:02:19 1:07:22 1:12:25 1:17:29 TIME


E90BC1 #1800-3000 11-NOV-88 10:10 70-E (EI+) Sys:AR070 IHP
Chromatogram Identifiers C0:191 C: 11178000
Text:
m/z 217
Steranes
2349
2426
2521
2280
2120
2197
2253
2227
1957
1967
2643
2749
2577
C
100
80
60
40
20
0
1800 2000 2200 2400 2600 2800 3000 SCAN
47:09 52:12 57:16 1:02:19 1:07:22 1:12:25 1:17:29 TIME



m/z 257
Rearranged sterenes



m/z 271
Rearranged sterenes with nuclear methyl group ?

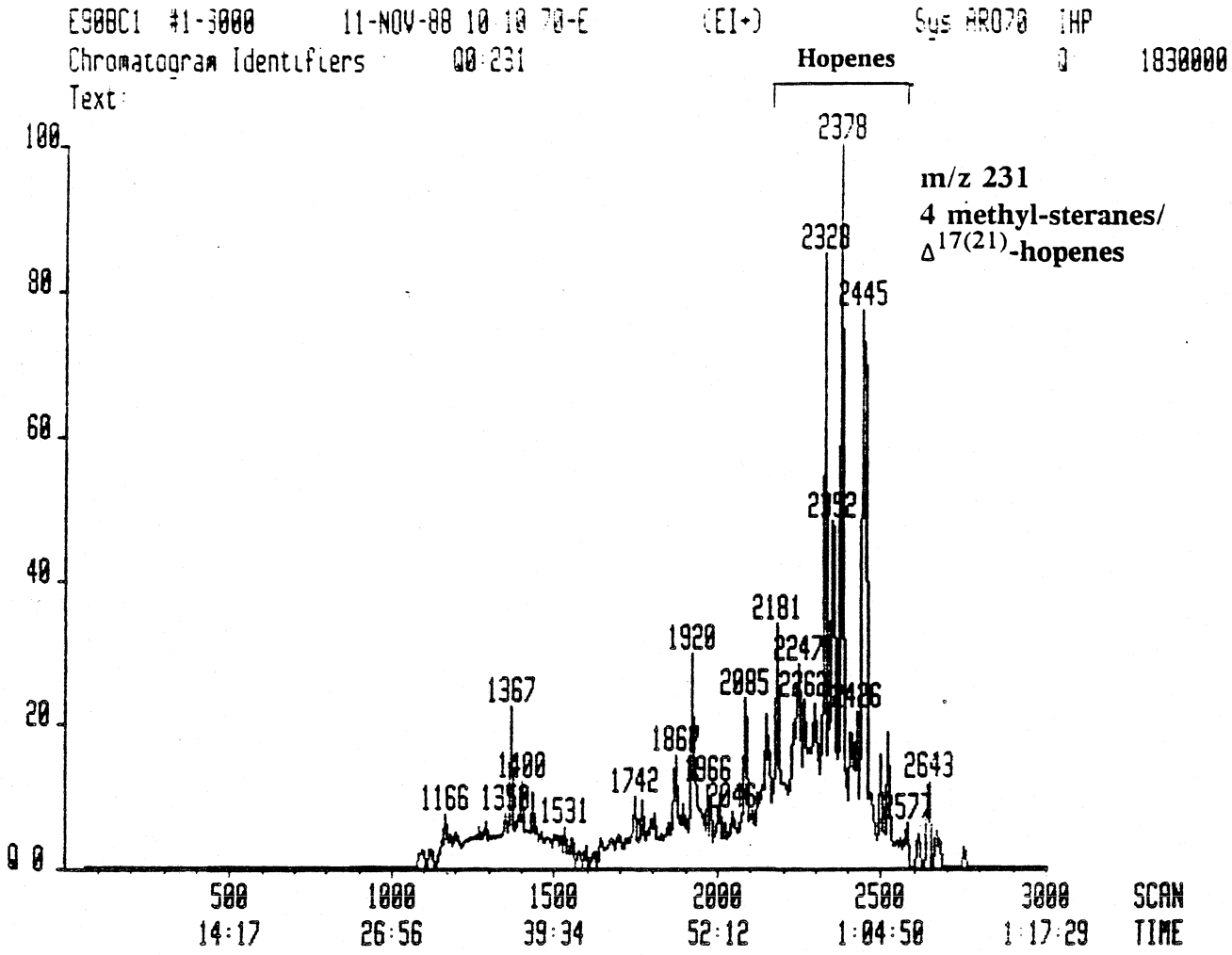

E90BC1 #1-3000 11-NOV-88 10 10 70-E (EI+) Sys AR070 IHP
Chromatogram Identifiers Q0:231 Q 1830000
Text:
Hopenes
m/z 231
4 methyl-steranes/
Δ17(21)-hopenes
2378
2328
2445
2192
2181
1920
2247
2085
1367
1866
1742
1531
2643
100
80
60
40
20
0
500
1000
1500
2000
2500
3000
SCAN
14:17
26:56
39:34
52:12
1:04:50
1:17:29
TIME

Figure III.7.2

Huminite reflectance histograms

Key: A = Grey-black-brown claystone.
Upper case letters indicate values included in the main population. Lower case letters represent values in other populations.

PP = Statistical data populations
Y = Main population, not necessarily representative of sample maturity,
N = Other populations.

LOW+HIGH = Population limits

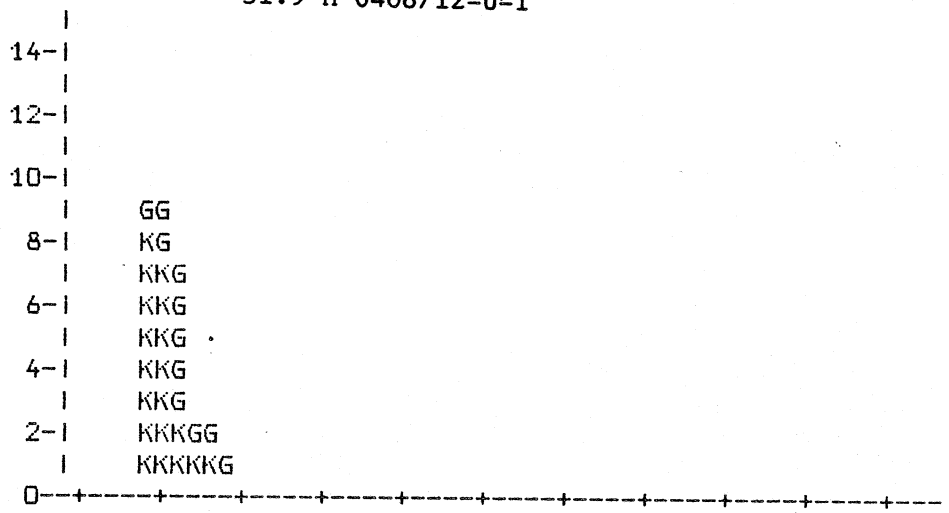
VAL. = Number of measurements in that population

Lithology cross-reference table

A = Clst. gy
B = Clst. dk gy
C = Clst. gn
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbargillite
N = Siltstone
O = Bit
P = X

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IKU# E-92 31.9 M 6408/12-U-1



PP	LOW	HIGH	LIT	#VAL	MEAN	STDV
Y	0.20	0.49	ALL	30	0.29	0.07
			OVERALL	30	0.29	0.07

ORDERED VALUES FOLLOW:

0.20K 0.20K 0.20K 0.20K 0.20K 0.21K 0.24G 0.24K 0.24K 0.25K 0.25G
0.26K 0.26K 0.27K 0.28K 0.28K 0.28G 0.28K 0.30G 0.30K 0.30G 0.30G
0.31G 0.32K 0.33G 0.36G 0.38K 0.41K 0.44G 0.48G

IKU SINTEF-GRUPPEN

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Appendix to Main Report:

Organic geochemical data

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SINTEF GROUP